Thecus

N8900 series
N12000 series
N16000 series
N6850/N8850/N10850
N7700PRO V2/N8800PRO V2

User's Manual

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About This Manual

All information in this manual has been carefully verified to ensure its correctness. In case of an error, please provide us with your feedback. Thecus Technology Corporation reserves the right to modify the contents of this manual without notice.

Product name: Thecus N8900 / N12000 / N16000 series/N6850/N8850/N10850/N7700PRO V2/N8800PRO V2
Manual Version: 3.0
Release Date: MAR. 2012

Limited Warranty

Thecus Technology Corporation guarantees all components of Thecus NAS products are thoroughly tested before they leave the factory and should function normally under general usage. In case of any system malfunctions, Thecus Technology Corporation and its local representatives and dealers are responsible for repair without cost to the customer if the product fails within the warranty period and under normal usage. Thecus Technology Corporation is not responsible for any damage or loss of data deemed to be caused by its products. It is highly recommended that users conduct necessary back-up practices.

Check the functions that are available on your particular Thecus NAS model at:

http://www.Thecus.com

Safety Warnings

For your safety, please read and follow the following safety warnings:

- Read this manual thoroughly before attempting to set up your Thecus IP storage.
- Your Thecus IP storage is a complicated electronic device. DO NOT attempt to repair it under any circumstances. In the case of malfunction, turn off the power immediately and have it repaired at a qualified service center. Contact your vendor for details.
- DO NOT allow anything to rest on the power cord and DO NOT place the power cord in an area where it can be stepped on. Carefully place connecting cables to avoid stepping or tripping on them.
- Your Thecus IP storage can operate normally under temperatures between 5°C and 40°C, with relative humidity of 20% – 85%. Using Thecus IP storage under extreme environmental conditions could damage the unit.
- Ensure that the Thecus IP storage is provided with the correct supply voltage (AC 100V ~ 240V, 50/60 Hz, 3A). Plugging the Thecus IP storage to an incorrect power source could damage the unit.
- Do NOT expose Thecus IP storage to dampness, dust, or corrosive liquids.
- Do NOT place Thecus IP storage on any uneven surfaces.
- DO NOT place Thecus IP storage in direct sunlight or expose it to other heat sources.
- DO NOT use chemicals or aerosols to clean Thecus IP storage. Unplug the power cord and all connected cables before cleaning.
- DO NOT place any objects on the Thecus IP storage or obstruct its ventilation slots to avoid overheating the unit.
- Keep packaging out of the reach of children.
- If disposing of the device, please follow your local regulations for the safe disposal of electronic products to protect the environment.

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Chapter 1: Introduction

Overview

Thank you for choosing the Thecus IP Storage Server. The Thecus IP storage is an easy-to-use storage server that allows a dedicated approach to storing and distributing data on a network. Data reliability is ensured with RAID features that provide data security and recovery—over multiple Terabyte of storage are available using RAID 5 and RAID 6. Gigabit Ethernet ports enhance network efficiency, allowing Thecus IP storage to take over file management functions, increase application and data sharing and provide faster data response. The Thecus IP storage offers data mobility with a disk roaming feature that lets you swap working hard drives for use in other Thecus IP storage, securing the continuity of data in the event of hardware failure. The Thecus IP storage allows data consolidation and sharing between Windows (SMB/CIFS), UNIX/Linux, and Apple OS X environments. The Thecus IP storage's user-friendly GUI supports multiple Languages.

Product Highlights

File Server

First and foremost, the Thecus IP storage allows you to store and share files over an IP network. With a Network Attached Storage (NAS) device, you can centralize your files and share them easily over your network. With the easy-to-use web-based interface, users on your network can access these files in a snap.

To learn about the Web User Interface, go to
Chapter 4: Using the Thecus IP Storage > Web Administration Interface

FTP Server

With the built-in FTP Server, friends, clients, and customers can upload and download files to your Thecus IP storage over the Internet with their favorite FTP programs. You can create user accounts so that only authorized users have access.

To set up the FTP Server, refer to
Chapter 4: Network Service> FTP .

iTunes Server

With the built-in iTunes server capability, the Thecus IP storage enables digital music to be shared and played anywhere on the network!

To set up the iTunes Server, refer to
Chapter 4: Application Server>iTunes Configuration.

Printer Server

With the Thecus IP storage's Printer Server, you can easily share an IPP printer with other PCs connected to your network.

To set up the Printer Server, refer to
Chapter 4: External Devices Server>Printer Information.

Multiple RAID

Thecus IP storage supports multiple RAID volumes on one system. So, you can create RAID 0 for your non-critical data, and create RAID 1,5,6,50 or 60 (depend on model) for mission-critical data. Create the RAID levels depending on your needs.

To configure RAID modes on the Thecus IP storage, refer to
Chapter 4: Storage Management >RAID Information.

iSCSI Capability

Thecus IP storage is not only a file server, but it also supports iSCSI initiators. Your server can access Thecus IP storage as a direct-attached-storage over the LAN or Internet. There is no easier way to expand the capacity of your current application servers. All the storage needs can be centrally managed and deployed. This brings ultimate flexibility to users.

To set up an iSCSI volume, refer to
Chapter 4: Storage Management > iSCSI

Superior Power Management

Thecus IP storage supports schedule power on/off. With this feature, administrator can set at what time to turn on or off the system. This feature is a big plus for people who want to conserve energy. Wake-On-LAN enables administrator to remotely turn on the system without even leaving their own seat.

To schedule system on and off, refer to
Chapter 4: System Management> Scheduled Power On/Off

Package Contents

N8900/N12000/N16000 Series/N8800PRO V2

The Thecus IP storage should contain the following common items:

- System Unit x1
- QIG (Quick Installation Guide) x1
- CD-Title (Acronis backup CD & Universal CD & TwonkyMedia CD)
- Ethernet Cable x1
- Accessory bag x1
- HDD Compatibility list Card x1
- Multiple Languages Warranty Card x1
- Power cord x2

N6850/N8850/N10850/N7700PRO V2

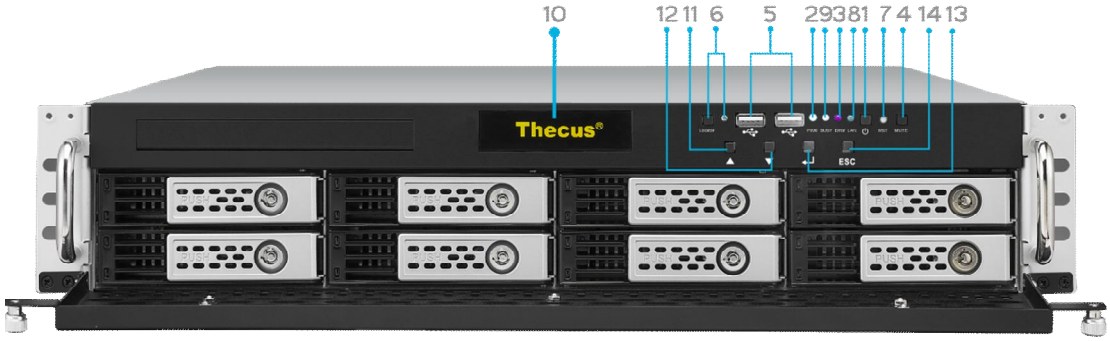
The Thecus IP storage should contain the following common items:

- System Unit x1
- QIG (Quick Installation Guide) x1
- CD-Title (Acronis backup CD & Universal CD & TwonkyMedia CD)
- Ethernet Cable x1
- Accessory bag x1
- HDD Compatibility list Card x1
- Multiple Languages Warranty Card x1
- Power cord x1

Please check to see if your package is complete. If you find that some items are missing, contact your dealer.

Front Panel

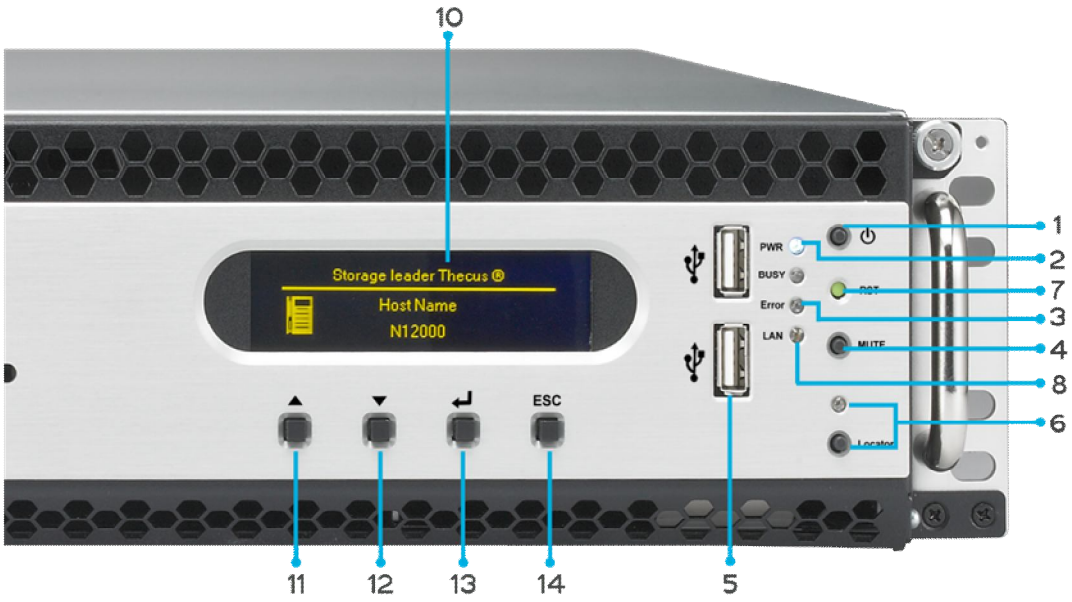
N8900 series:



Front Panel	
Item	**Description**
1.Power Button	• Power on/off N8900
2.Power LED	• **Solid green:** System is power on.
3.System error LED	• Solid RED: System error.
4.Mute button	• Mute the system fan alarm.
5.USB Port	• USB 2.0 port for compatible USB devices, such as USB disks and USB printers
6. Locator button / LED	• Press the button, the back led will light up to identify the system position of the rack
7. RST	• Reboot system.
8. LAN	• Blinking green: network activity • Solid green: network link
9. BUSY	• Blinking orange: system startup or system maintenance; data currently inaccessible
10.OLED	• Displays current system status and messages • OLED screen saver will be enabled after screen is idle for more than 3 minutes • OLED screen will be turn off after idle for more than 6 minutes
11.Up Button ▲	• Push to scroll up when using the OLED display
12.Down Button ▼	• Push to enter USB copy operation screen
13.Enter Button ↵	• Push to enter OLED operate password for basic system setting
14.Escape Button **ESC**	• Push to leave the current OLED menu

N12000 series:

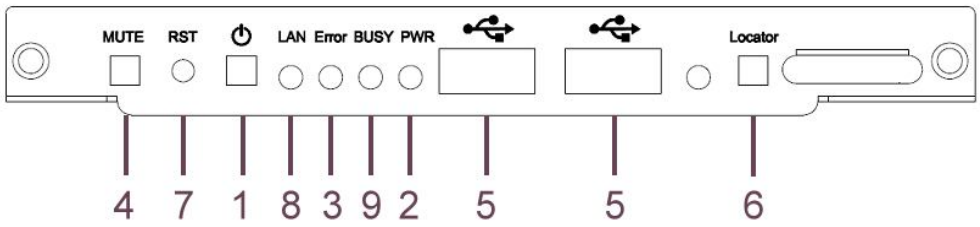
The Thecus N12000 series front panel has the device's controls, indicators, and hard disk trays:



Front Panel	
Item	**Description**
1.Power Button	• Power on/off N12000
2.Power LED	• **Solid green:** System is power on.
3.System error LED	• Solid RED: System error.
4.Mute button	• Mute the system fan alarm.
5.USB Port	• USB 2.0 port for compatible USB devices, such as USB disks and USB printers
6. Locator button / LED	• Press the button, the back led will light up to identify the system position of the rack
7. RST	• Reboot system.
8. LAN	• Blinking green: network activity • Solid green: network link
9. BUSY	• Blinking orange: system startup or system maintenance; data currently inaccessible
10.OLED	• Displays current system status and messages • OLED screen saver will be enabled after screen is idle for more than 3 minutes • OLED screen will be turn off after idle for more than 6 minutes
11.Up Button ▲	• Push to scroll up when using the OLED display
12.Down Button ▼	• Push to enter USB copy operation screen
13.Enter Button ↵	• Push to enter OLED operate password for basic system setting
14.Escape Button **ESC**	• Push to leave the current OLED menu

N16000 series:

The Thecus N16000 series front panel has the device's controls, indicators, and hard disk trays:



Front Panel	
Item	**Description**
1.Power Button	• Power on/off N16000
2.Power LED	• **Solid green:** System is power on.
3.System error LED	• Solid RED: System error.
4.Mute button	• Mute the system fan alarm.
5.USB Port	• USB 2.0 port for compatible USB devices, such as USB disks and USB printers
6. Locator button / LED	• Press the button, the back led will light up to identify the rack position of the system
7. RST	• Reboot system.
8. LAN	• Blinking green: network activity • Solid green: network link
9. BUSY	• Blinking orange: system startup or system maintenance; data currently inaccessible
10.OLED	• Displays current system status and messages • OLED screen saver will be enabled after screen is idle for more than 3 minutes • OLED screen will be turn off after idle for more than 6 minutes
11.Up Button ▲	• Push to scroll up when using the OLED display
12.Down Button ▼	• Push to enter USB copy operation screen
13.Enter Button ↵	• Push to enter OLED operate password for basic system setting
14.Escape Button **ESC**	• Push to leave the current OLED menu

N6850:

The Thecus N6850's front panel has the device's controls, indicators, and hard disk trays:

Front Panel	
Item	**Description**
1. Power Button	• Power on/off N6850
2. USB Port	• USB 2.0 port for compatible USB devices, such as digital cameras, USB disks, and USB printers.
3. USB Port	• USB 3.0 port for compatible USB devices, such as digital cameras, USB disks, and USB printers.
4. LAN2 LED	• **Solid white:** LAN2 Cable link • **Blinking :** Network activity
5. LAN1 LED	• **Solid white:** LAN1 Cable link • **Blinking :** Network activity
6. USB LED	• **Solid white:** USB busy • **Solid Red:** USB error
7. System LED	• **Solid white:** System is power on.
8. OLED	• Displays system status and information
9. System Error LED	• **Blinking RED:** System error.
10. Down Button	• Push to enter USB copy operation screen
11. Up Button	• Push to scroll up when using the OLED display
12. Enter Button	• Push to enter OLED operate password for basic system setting
13. Escape Button	• Push to leave the current OLED menu

N8850:

The Thecus N8850's front panel has the device's controls, indicators, and hard disk trays:

Front Panel	
Item	**Description**
1. Power Button	• Power on/off N8850
2. USB Port	• USB 2.0 port for compatible USB devices, such as digital cameras, USB disks, and USB printers.
3. USB Port	• USB 3.0 port for compatible USB devices, such as digital cameras, USB disks, and USB printers.
4. LAN2 LED	• **Solid white:** LAN2 Cable link • **Blinking :** Network activity
5. LAN1 LED	• **Solid white:** LAN1 Cable link • **Blinking :** Network activity
6. USB LED	• **Solid white:** USB busy • **Solid Red:** USB error
7. System LED	• **Solid white:** System is power on.
8. OLED	• Displays system status and information
9. System Error LED	• **Blinking RED:** System error.
10. Down Button	• Push to enter USB copy operation screen
11. Up Button	• Push to scroll up when using the OLED display
12. Enter Button	• Push to enter OLED operate password for basic system setting
13. Escape Button	• Push to leave the current OLED menu

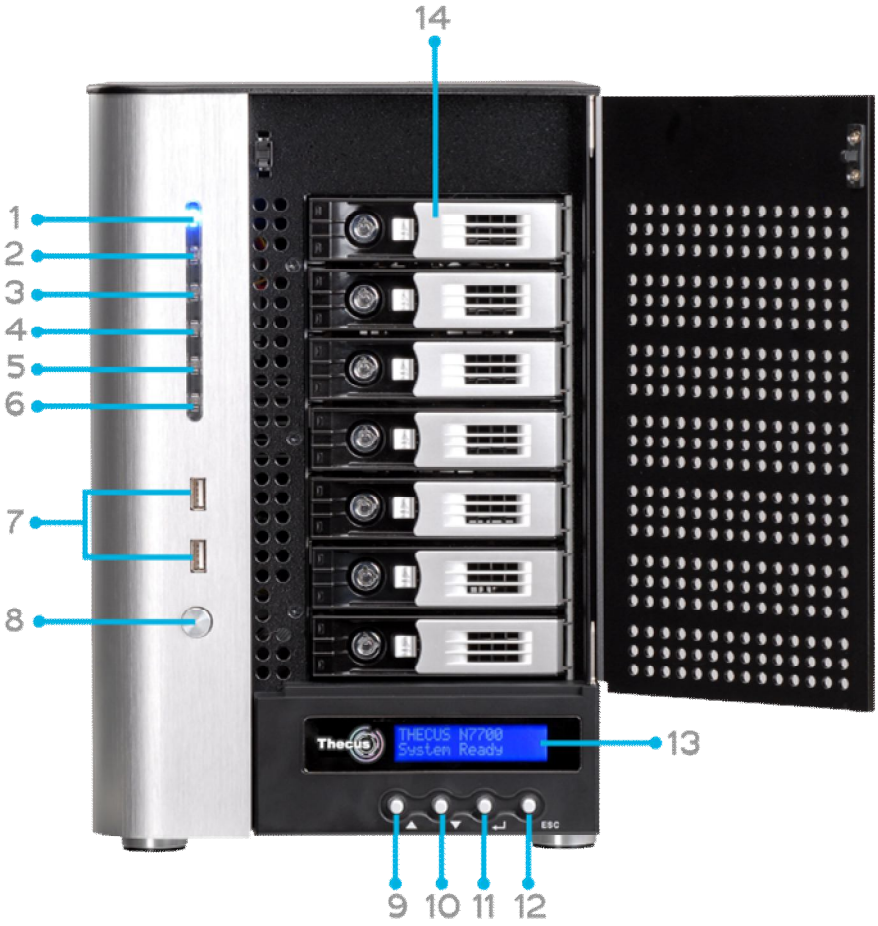
N10850:

The Thecus N10850's front panel has the device's controls, indicators, and hard disk trays:

Front Panel	
Item	**Description**
1. Power Button	• Power on/off N10850
2. USB Port	• USB 2.0 port for compatible USB devices, such as digital cameras, USB disks, and USB printers.
3. USB Port	• USB 3.0 port for compatible USB devices, such as digital cameras, USB disks, and USB printers.
4. LAN2 LED	• **Solid white:** LAN2 Cable link • **Blinking :** Network activity
5. LAN1 LED	• **Solid white:** LAN1 Cable link • **Blinking :** Network activity
6. USB LED	• **Solid white:** USB busy • **Solid Red:** USB error
7. System LED	• **Solid white:** System is power on.
8. OLED	• Displays system status and information
9. System Error LED	• **Blinking RED:** System error.
10. Down Button	• Push to enter USB copy operation screen
11. Up Button	• Push to scroll up when using the OLED display
12. Enter Button	• Push to enter OLED operate password for basic system setting
13. Escape Button	• Push to leave the current OLED menu

N7700PRO V2:

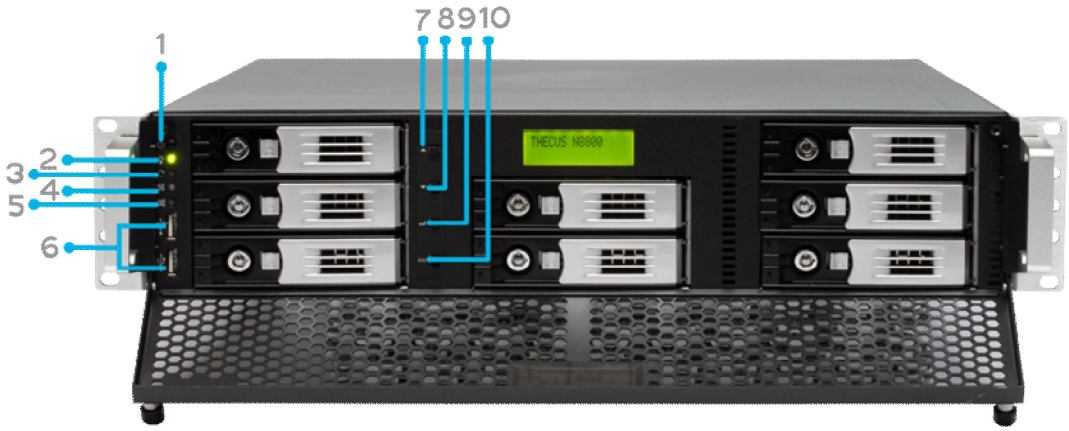
The Thecus N7700PRO V2 front panel has the device's controls, indicators, and hard disk trays:



Front Panel	
Item	**Description**
1.Power LED	• **Solid blue:** System is power on.
2.System LED	• **Solid orange:** system is being upgraded or system startup; data currently inaccessible
3.WAN/LAN1 LED	• **Solid green:** network link • **Blinking green:** network activity
4.LAN2 LED	• **Solid green:** network link • **Blinking green:** network activity
5.USB Copy LED	• **Solid blue:** files are being copied from a USB storage device
6.eSATA link LED	• **Solid blue:** external eSATA device has connected
7.USB Port	• USB 2.0 port for compatible USB devices, such as USB disks.
8.Power Button	• Power on/off N7700PRO V2
9.Up Button ▲	• Push to scroll up when using the LCD display
10.Down Button ▼	• Push to enter USB copy operation screen
11.Enter Button ↵	• Push to enter LCD operate password for basic system setting
12.Escape Button **ESC**	• Push to leave the current LCD menu
13.LCD Display	• Displays current system status and warning messages
14.HDD Trays	• Seven 3.5" SATA HDD trays • Locks are provided for added security

N8800PRO V2:

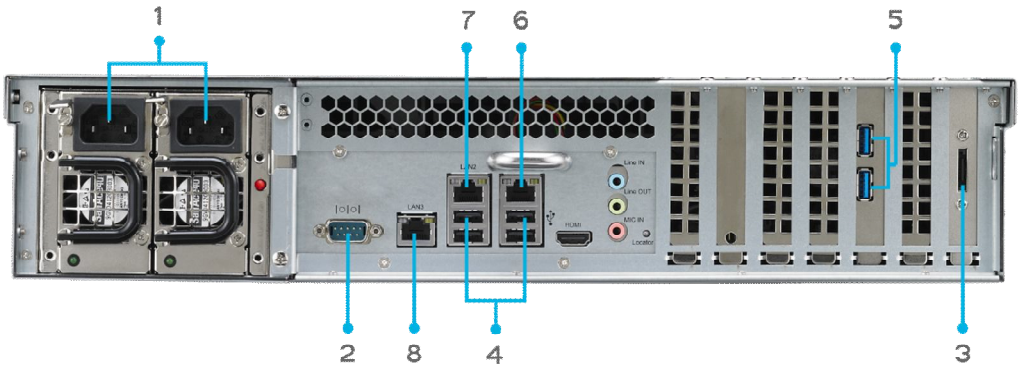
The Thecus N8800PRO V2 front panel has the device's controls, indicators, and hard disk trays:



Front Panel	
Item	**Description**
1.Power Button	• Power on/off N8800PRO V2
2.Power LED	• **Solid green:** System is power on.
3.Reboot Button	• Press to system reboot
4.System fan alarm LED	• **Solid red:** system fan failure notification
5. Mute button	• Mute the system fan alarm.
6.USB Port	USB 2.0 port for compatible USB devices, such as USB disks, USB printers
7.Up Button ▲	• Push to scroll up when using the LCD display
8.Down Button ▼	• Push to enter USB copy operation screen
9.Enter Button ↵	• Push to enter LCD operate password for basic system setting
10.Escape Button **ESC**	• Push to leave the current LCD menu

Rear Panel

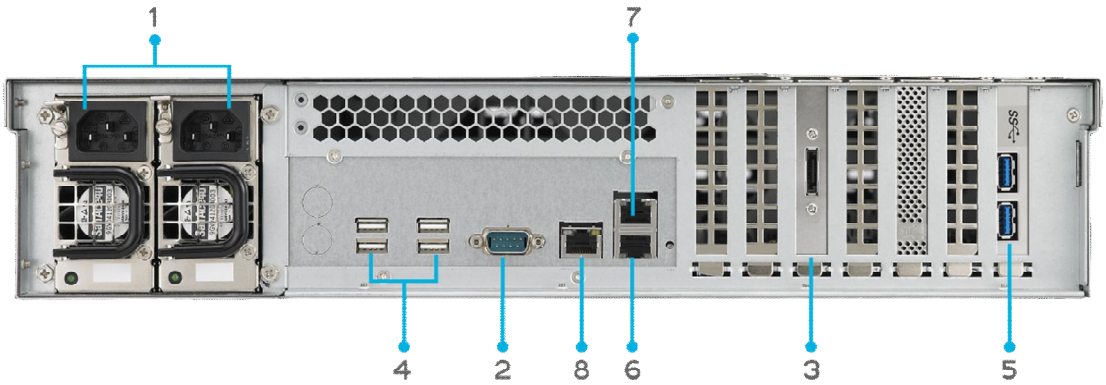
N8900



Back Panel	
Item	**Description**
1.Power Connector	• Connect the included power cords to these connectors
2.Serial Port	• This port is for external UPS device
3.eSATA Port	• eSATA port for high-speed storage expansion
4.USB Port	• USB 2.0 port for compatible USB devices, such as USB disks, and USB printers
5.USB Port	• USB 3.0 port for compatible USB devices.
6.WAN/LAN1 Port	• WAN/LAN1 port for connecting to an Ethernet network through a switch or router
7.LAN2 Port	• LAN2 port for connecting to an Ethernet network through a switch or router
8.LAN3 Port	• LAN3 port for connecting to an Ethernet network through a switch or router.

N12000 series:

The N12000 rear panel features ports and connectors.

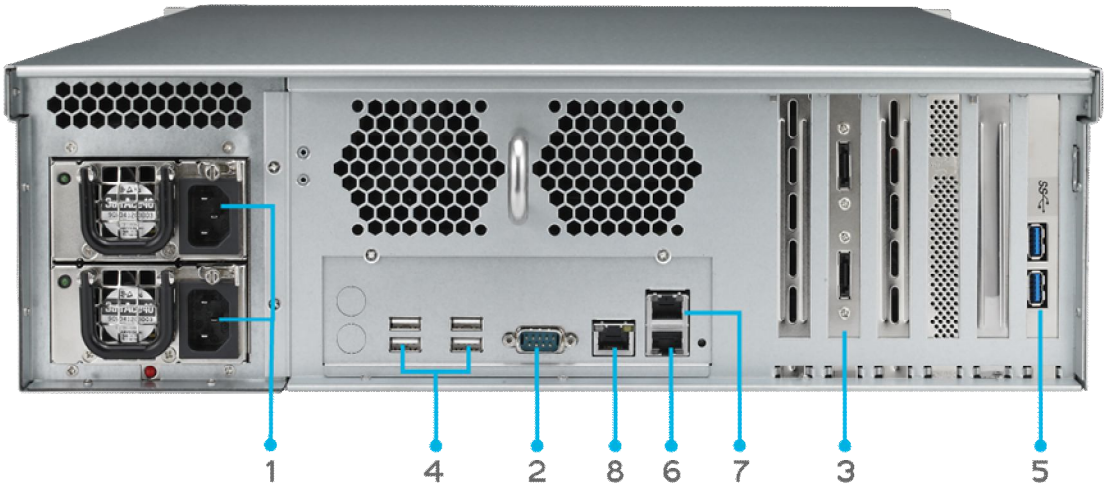


Back Panel	
Item	**Description**
1.Power Connector	• Connect the included power cords to these connectors
2.Serial Port	• This port is for external UPS device
3.eSATA Port	• eSATA port for high-speed storage expansion
4.USB Port	• USB 2.0 port for compatible USB devices, such as USB disks, and USB printers

5.USB Port	• USB 3.0 port for compatible USB devices.
6.WAN/LAN1 Port	• WAN/LAN1 port for connecting to an Ethernet network through a switch or router
7.LAN2 Port	• LAN2 port for connecting to an Ethernet network through a switch or router
8.LAN3 Port	• LAN3 port for HA connecting.

N16000 series:

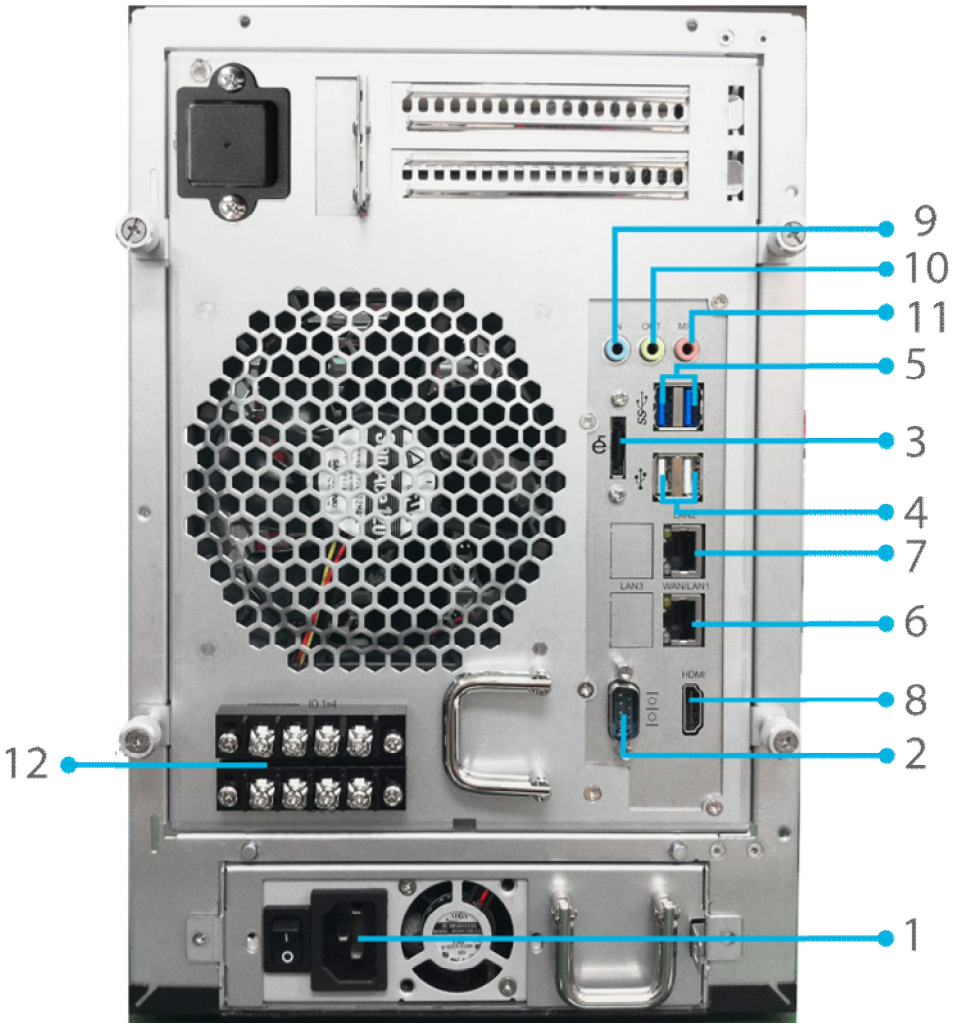
The N16000 rear panel features ports and connectors.



Back Panel	
Item	**Description**
1.Power Connector	• Connect the included power cords to these connectors
2.Serial Port	• This port is for external UPS device
3.eSATA Port	• eSATA port for high-speed storage expansion
4.USB Port	• USB 2.0 port for compatible USB devices, such as USB disks, and USB printers
5.USB Port	• USB 3.0 port for compatible USB devices.
6.WAN/LAN1 Port	• WAN/LAN1 port for connecting to an Ethernet network through a switch or router
7.LAN2 Port	• LAN2 port for connecting to an Ethernet network through a switch or router
8.LAN3 Port	• LAN3 port for HA connecting.

N6850:

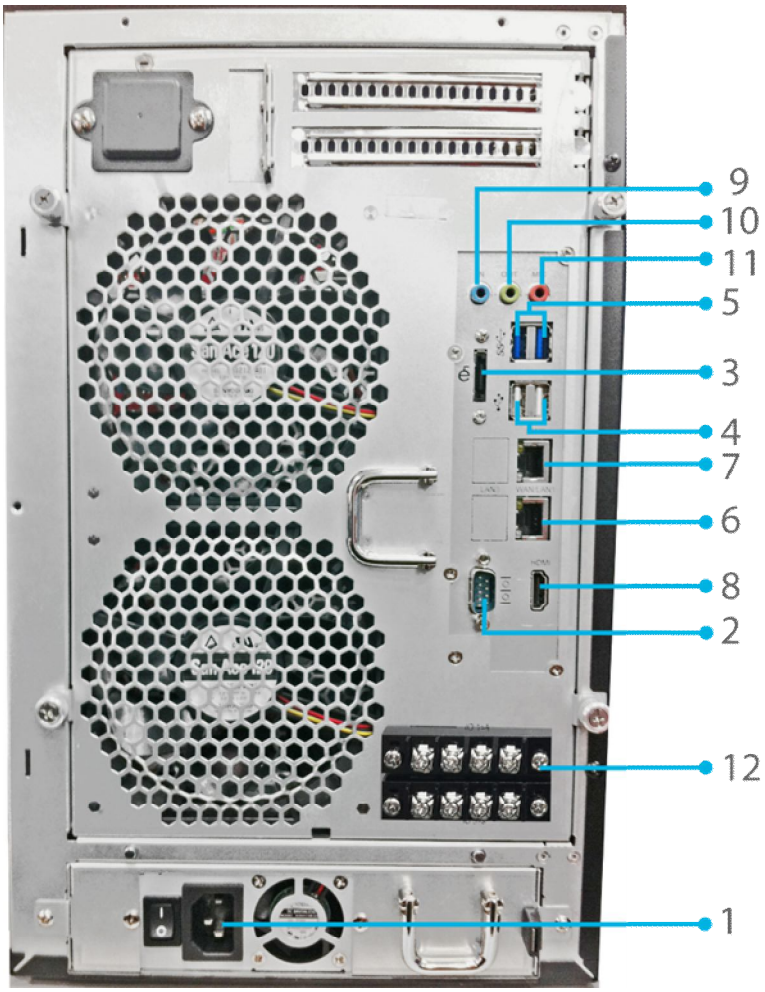
The N6850 rear panel features ports and connectors.



Back Panel	
Item	**Description**
1.Power Connector	• Connect the included power cords to these connectors
2.Serial Port	• This port is for external UPS device
3.eSATA Port	• eSATA port for high-speed storage expansion
4.USB Port	• USB 2.0 port for compatible USB devices, such as USB disks, and USB printers
5.USB Port	• USB 3.0 port for compatible USB devices.
6.WAN/LAN1 Port	• WAN/LAN1 port for connecting to an Ethernet network through a switch or router
7.LAN2 Port	• LAN2 port for connecting to an Ethernet network through a switch or router
8.HDMI Port	• For Video/Audio out
9.Line in	• For Audio in
10. Line out	• For Audio out
11. Mic input	• Microphone input
12. User GPIO	• Could define each GPIO (0~7) and implement its own functionality.

N8850:

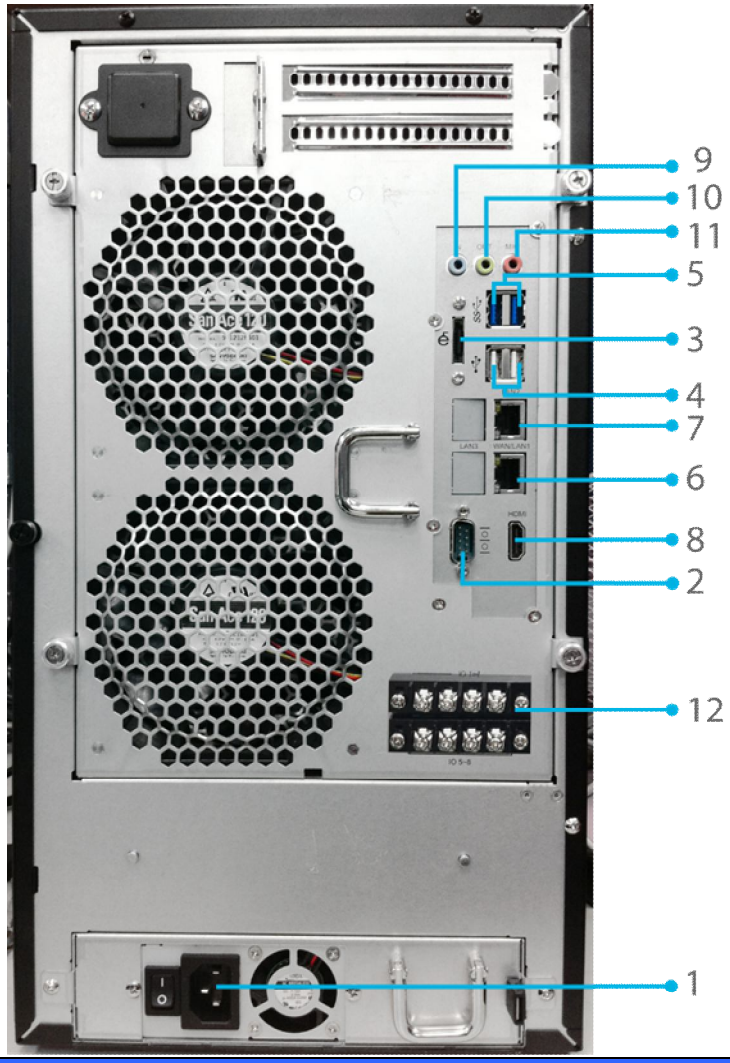
The N8850 rear panel features ports and connectors.



Back Panel	
Item	**Description**
1.Power Connector	• Connect the included power cords to these connectors
2.Serial Port	• This port is for external UPS device
3.eSATA Port	• eSATA port for high-speed storage expansion
4.USB Port	• USB 2.0 port for compatible USB devices, such as USB disks, and USB printers
5.USB Port	• USB 3.0 port for compatible USB devices.
6.WAN/LAN1 Port	• WAN/LAN1 port for connecting to an Ethernet network through a switch or router
7.LAN2 Port	• LAN2 port for connecting to an Ethernet network through a switch or router
8.HDMI Port	• For Video/Audio out
9.Line in	• For Audio in
10. Line out	• For Audio out
11. Mic input	• Microphone input
12. User GPIO	• Could define each GPIO (0~7) and implement its own functionality.

N10850:

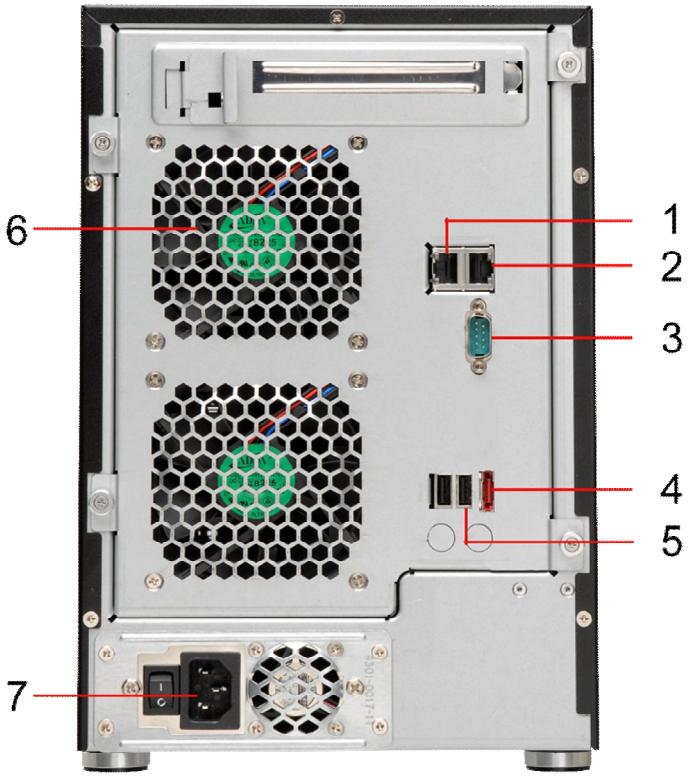
The N10850 rear panel features ports and connectors.



Back Panel	
Item	**Description**
1.Power Connector	• Connect the included power cords to these connectors
2.Serial Port	• This port is for external UPS device
3.eSATA Port	• eSATA port for high-speed storage expansion
4.USB Port	• USB 2.0 port for compatible USB devices, such as USB disks, and USB printers
5.USB Port	• USB 3.0 port for compatible USB devices.
6.WAN/LAN1 Port	• WAN/LAN1 port for connecting to an Ethernet network through a switch or router
7.LAN2 Port	• LAN2 port for connecting to an Ethernet network through a switch or router
8.HDMI Port	• For Video/Audio out
9.Line in	• For Audio in
10.Line out	• For Audio out
11.Mic input	• Microphone input
12. User GPIO	• Could define each GPIO (0~7) and implement its own functionality.

N7700PRO V2:

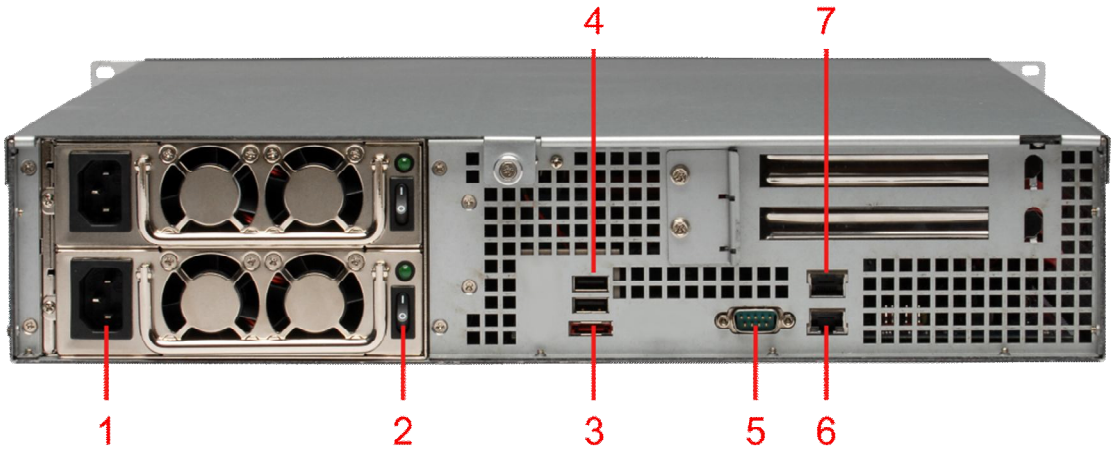
The N7700PRO V2 rear panel features ports and connectors.



Back Panel	
Item	**Description**
1.LAN2 Port	• LAN2 port for connecting to a local Ethernet network through a switch or router.
2.WAN/LAN1 Port	• WAN/LAN1 port for connecting to an Ethernet network through a switch or router.
3.Serial Port	• This port is for an external UPS device.
4.eSATA Port	• eSATA port for high-speed storage expansion.
5.USB Port	• USB 2.0 port for compatible USB devices, such as USB disks, and USB printers.
6.System Fan	• System fan that exhausts heat from the unit.
7.Power Connector	• Connect the included power cord to this connector.

N8800PRO V2:

The N8800PRO V2 rear panel features ports and connectors.



Back Panel	
Item	**Description**
1.Power Connector	• Connect the included power cords to these connectors
2.Power Switch	• Switch for power supply
3.eSATA Port	• eSATA port for high-speed storage expansion
4.USB Port	• USB 2.0 port for compatible USB devices, such as USB disks, and USB printers
5.Serial Port	• This port is for external UPS device
6.WAN/LAN1 Port	• WAN/LAN1 port for connecting to an Ethernet network through a switch or router
7.LAN2 Port	• WAN/LAN1 port for connecting to an Ethernet network through a switch or router

Chapter 2: Hardware Installation

Overview

Your Thecus IP storage is designed for easy installation. To help you get started, the following chapter will help you quickly get your Thecus IP storage up and running. Please read it carefully to prevent damaging your unit during installation.

Before You Begin

Before you begin, be sure to take the following precautions:

1. Read and understand the ***Safety Warnings*** outlined in the beginning of the manual.

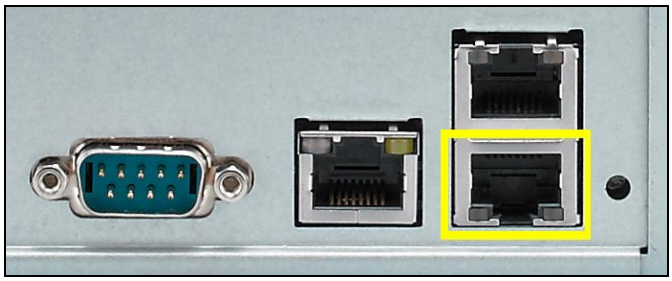
2. If possible, wear an anti-static wrist strap during installation to prevent static discharge from damaging the sensitive electronic components on the Thecus IP storage.

3. Be careful not to use magnetized screwdrivers around the Thecus IP storage's electronic components.

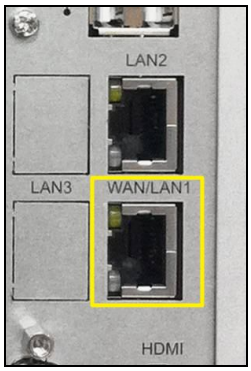
Cable Connections

To connect the Thecus IP storage product to your network, follow the steps below:

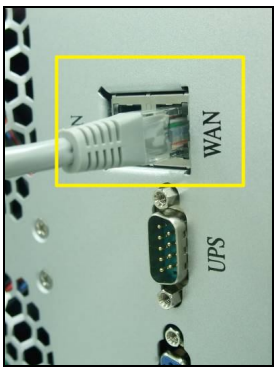
1. Connect an Ethernet cable from your network to the WAN/LAN1 port on the back panel of the Thecus IP storage.



▲ *N12000 series/N16000 series/N8900 series WAN/LAN1 port*



▲ *N6850/N8850/N10850 WAN/LAN1 port*

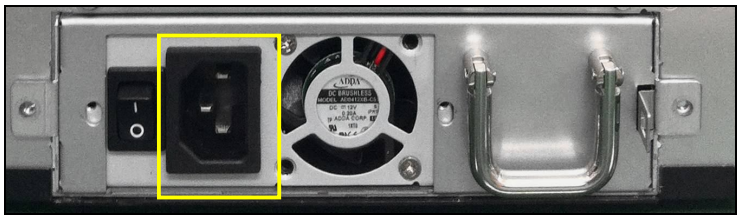


▲ *N7700PRO V2 WAN/LAN1 port*

▲ *N8800PRO V2 WAN/LAN1 port*

2. Connect the provided power cord into the universal power socket on the back panel. Plug the other end of the cord into a surge protector socket.

▲ *N12000 series/N16000 series/N8900 series power socket*

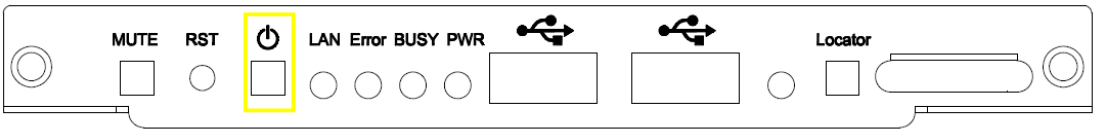


▲ *N6850/N8850/N10850 power socket*

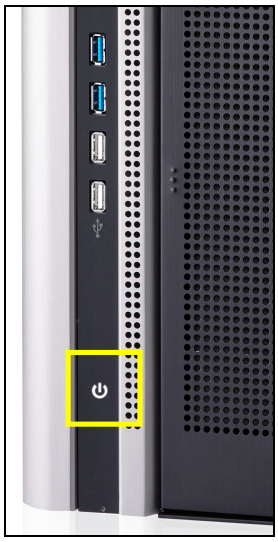
▲ *N7700PRO V2 power socket*

▲ *N8800PRO V2 power socket*

3. Press the power button on the Front Panel to boot up the Thecus IP storage.



▲ *N12000 series/N16000 series/N8900 series power button*



◀ *N6850/N8850/N10850 power button*

▲ *N7700PRO V2 power button*

▲ *N8800PRO V2 power button*

Chapter 3: First Time Setup

Overview

Once the hardware is installed, physically connected to your network, and powered on, you can configure the Thecus IP storage so that it is accessible to your network users. There are two ways to set up your Thecus IP storage: using the **Thecus Setup Wizard** or the **LCD display**. Follow the steps below for initial software setup.

Thecus Setup Wizard

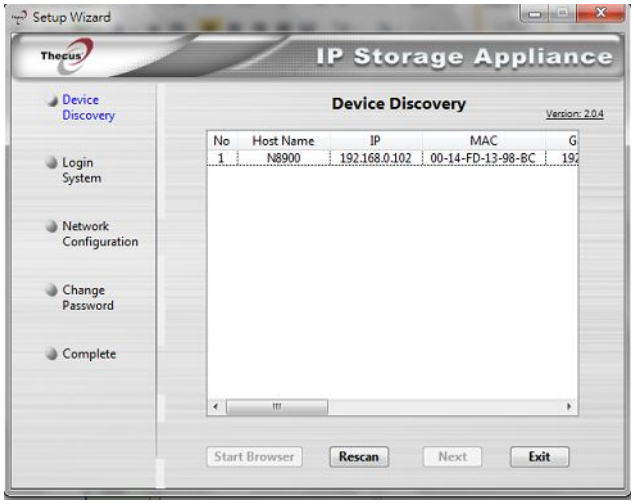
The handy Thecus Setup Wizard makes configuring Thecus IP storage a snap. To configure the Thecus IP storage using the Setup Wizard, perform the following steps:

1. Insert the installation CD into your CD-ROM drive (the host PC must be connected to the network).

2. The Setup Wizard should launch automatically. If not, please browse your CD-ROM drive and double click on **Setup.exe.**

NOTE For MAC OS X users, double click on Thecus Setup Wizard .dmg file.

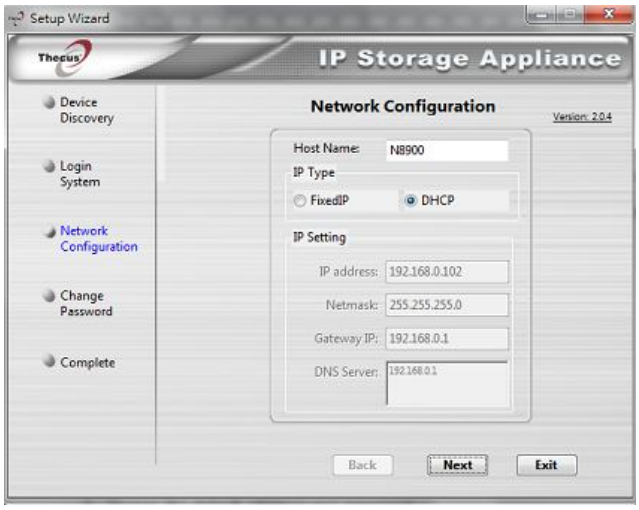
3. The Setup Wizard will start and automatically detect all Thecus storage devices on your network. If none are found, please check your connection and refer to **Chapter 7: Troubleshooting** for assistance.



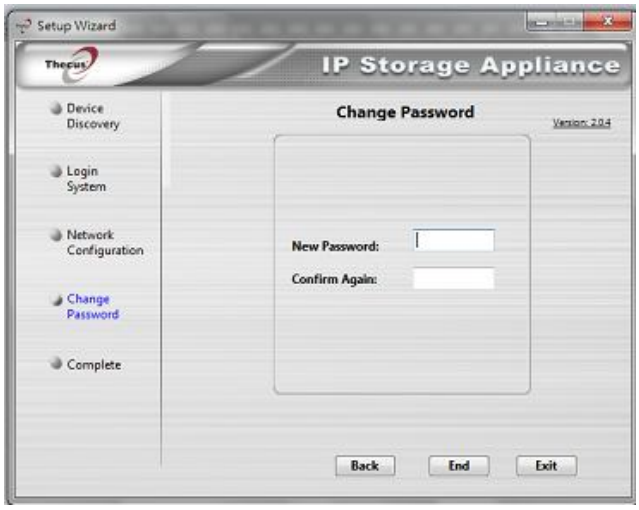
4. Select the Thecus IP storage that you like to configure.

5. Login with the administrator account and password. The default account and password are both "admin".

6. Name your Thecus IP storage and configure the network IP address. If your switch or router is configured as a DHCP Server, configuring the Thecus IP storage to automatically obtain an IP address is recommended. You may also use a static IP address and enter the DNS Server address manually.



7. Change the default administrator password.



8. Finished! Access the Thecus IP storage Web Administrator Interface by pressing the ***Start Browser*** button. You can also configure another Thecus

IP storage at this point by clicking the ***Setup Other Device*** button. Press ***Exit*** to exit the wizard.

NOTE

The Thecus Setup Wizard is designed for installation on systems running Windows XP/2000/vista/7 or Mac OSX or later. Users with other operating systems will need to install the Thecus Setup Wizard on a host machine with one of these operating systems before using the unit.

LCD Operation (N7700PRO V2/N8800PRO V2)

The mentioned models above are equipped with an LCD on the front for easy status display and setup. There are four buttons on the front panel to control the LCD functions.

LCD Controls

Use the **Up** (▲), **Down** (▼), **Enter** (↵) and **Escape** (**ESC**) keys to select various configuration settings and menu options for Thecus IP storage configuration.

The following table illustrates the keys on the front control panel:

LCD Controls		
Icon	**Function**	**Description**
▲	Up Button	Select the previous configuration settings option.
▼	Down Button	USB copy confirmation display.
↵	Enter	Enter the selected menu option, sub-menu, or parameter setting.
ESC	Escape	Escape and return to the previous menu.

There are two modes of operation for the LCD: **Display Mode** and **Management Mode**.

Display Mode

During normal operation, the LCD will be in **Display Mode**.

Display Mode	
Item	**Description**
Host Name	Current host name of the system.
WAN/LAN1	Current WAN/LAN1 IP setting.
LAN2	Current LAN2 IP setting.
Link Aggregation	Current Link Aggregation status
System Fan1	Current system fan1 status.
System Fan2	Current system fan2 status.
CPU Fan	Current CPU fan status
2009/05/22 12:00	Current system time.
Disk Info	Current status of disk slot has been installed
RAID	Current RAID status.

The Thecus IP storage will rotate these messages every one-two seconds on the LCD display.

USB Copy

The USB Copy function enables you to copy files stored on USB devices such as USB disks and digital cameras to the Thecus IP storage by press button. To use USB copy, follow the steps below:

1. Plug your USB device into an available USB port on the Front end.
2. In **Display Mode**, press the **Down Button** (▼).
3. The LCD will display "`USB Copy?`"
4. Press **Enter** (↵) and the Thecus IP storage will start copying USB disks connected to the front USB port.
5. All of data will be copied into system folder named "USB copy".

Management Mode

During setup and configuration, the LCD will be in **Management Mode**.

To enter into Management Mode, press **Enter (↵)** and an "*Enter Password*" prompt will show on the LCD.

At this time, the administrator has to enter the correct LCD password. System will check whether the correct LCD password has been entered. The default LCD password is " `0000` ". If correct password is entered, you will enter into the **Management Mode** menu.

Management Mode	
Item	**Description**
WAN/LAN1 Setting	IP address and netmask of your WAN/LAN1 ports.
LAN2 Setting	IP address and netmask of your LAN2 ports.
Link Agg. Setting	Select **Load Balance, 802.3ad** or **Failover**.
Change Admin Passwd	Change administrator's password for LCD operation.
Reset to Default	Reset system to factory defaults.
Exit	Exit **Management Mode** and return to **Display Mode**.

NOTE

You can also change your LCD password using the Web Administration Interface by navigating to **System Management > Administrator Password**. For more on the Web Administration Interface, see **Chapter 4: System Management**.

OLED Operation(Does not apply to the N7700PRO V2/N8800PRO V2)

OLED Operation

The Thecus IP storage is equipped with an OLED on the front for easy status display and setup. There are four buttons on the front panel to control the OLED functions.

OLED Controls

Use the **Up** (▲), **Down** (▼), **Enter** (↵) and **Escape** (**ESC**) keys to select various configuration settings and menu options for Thecus IP storage configuration.

The following table illustrates the keys on the front control panel:

OLED Controls		
Icon	**Function**	**Description**
▲	Up Button	Select the previous configuration settings option.
▼	Down Button	USB copy confirmation display.
↵	Enter	Enter the selected menu option, sub-menu, or parameter setting.
ESC	Escape	Escape and return to the previous menu.

There are two modes of operation for the OLED: **Display Mode** and **Management Mode**.

Display Mode

During normal operation, the OLED will be in **Display Mode**.

Display Mode	
Item	**Description**
Host Name	Current host name of the system.
WAN/LAN1	Current WAN/LAN1 IP setting.
LAN2	Current LAN2 IP setting.
Link Aggregation	Current Link Aggregation status
System Fan	Current system fan status.
CPU Fan	Current CPU fan status
2009/05/22 12:00	Current system time.
RAID	Current RAID status.

The Thecus IP storage will rotate these messages every one-two seconds on the OLED display.

USB Copy

The USB Copy function enables you to copy files stored on USB devices such as USB disks and digital cameras to the Thecus IP storage with a press of a button. To use USB copy, follow the steps below:

1. Plug your USB device into an available USB port on the Front Panel.

2. In **Display Mode**, press the **Enter** (↵).

3. The LCD will display "**USB Copy?**"

4. Press **Enter** (↵) and the Thecus IP storage will start copying USB disks connected to the front USB port. The LCD will display the USB copy progress and results.

Typical Setup Procedure

From the Web Administration Interface, you can begin to setup your Thecus IP storage for use on your network. Setting up the Thecus IP storage typically follows the five steps outlined below.

For more on how to use the Web Administration Interface, see
Chapter 4: Web Administration Interface.

Step 1: Network Setup

From the Web Administration Interface, you can configure the network settings of the Thecus IP storage for your network. You can access the **Network** menu from the menu bar.
For details on how to configure your network settings, refer to
Chapter 4: System Network .

Step 2: RAID Creation

Next, administrators can configure their preferred RAID setting and build their RAID volume. You can access RAID settings from the menu bar of the Web Administration Interface by navigating to **Storage Management > RAID Management.**

For more information on configuring RAID, see
Chapter 4: Storage > RAID Management.

Don't know which RAID level to use? Find out more about the different RAID levels from **Appendix B: RAID Basics**.

Step 3: Create Local Users or Setup Authentication

Once the RAID is ready, you can begin to create local users for Thecus IP storage, or choose to setup authentication protocols such as Active Directory (AD).

For more on managing users, go to **Chapter 4: User and Group Authentication**.

For more information on configuring Active Directory, see
Chapter 4: User and Group Authentication > ADS Support.

For information about the benefits of Active Directory, see **Appendix D: Active Directory Basics**.

Step 4: Create Folders and Set Up ACLs

Once users are introduced into your network, you can begin to create various folders on the Thecus IP storage and control user access to each using Folder Access Control Lists.

More information on managing folders, see
Chapter 4: Storage Management > Share Folder .

To find out about configuring Folder Access Control Lists, see **Chapter 4: Storage Management > Share Folder> Folder Access Control List (ACL)**.

Step 5: Start Services

Finally, you can start to setup the different services of Thecus IP storage for the users on your network. You can find out more about each of these services by clicking below:

SMB/CIFS

Apple File Protocol (AFP)

Network File System (NFS)

File Transfer Protocol (FTP)

iTunes Server

Printer Server

Chapter 4: System Administration

Overview

The Thecus IP storage provides an easily accessible **Web Administration Interface**. With it, you can configure and monitor the Thecus IP storage anywhere on the network.

Web Administration Interface

Make sure your network is connected to the Internet. To access Thecus IP storage **Web Administration Interface**:

1. Type the Thecus IP storage IP address into your browser. (Default IP address is `http://192.168.1.100`)

NOTE

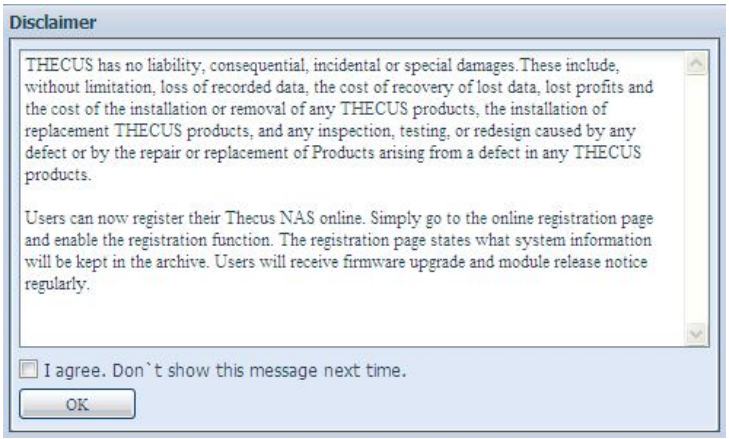
Your computer's network IP address must be on the same subnet as the Thecus IP storage. If the Thecus IP storage has default IP address of 192.168.1.100, your managing PC IP address must be 192.168.1.x, where x is a number between 1 and 254, but not *100*.

2. Login to the system using the administrator user name and password. The factory defaults are:

   User Name: `admin`
   Password: `admin`

※ If you changed your password in the setup wizard, use the new password.

Once you are logged in as an administrator disclaimer page will appear as below. Please click the check box if you do not want to have this page displayed during the next login.


Disclaimer
THECUS has no liability, consequential, incidental or special damages. These include, without limitation, loss of recorded data, the cost of recovery of lost data, lost profits and the cost of the installation or removal of any THECUS products, the installation of replacement THECUS products, and any inspection, testing, or redesign caused by any defect or by the repair or replacement of Products arising from a defect in any THECUS products.
Users can now register their Thecus NAS online. Simply go to the online registration page and enable the registration function. The registration page states what system information will be kept in the archive. Users will receive firmware upgrade and module release notice regularly.
I agree. Don`t show this message next time.
OK

Following by disclaim page, you will see the **Web Administration Interface**. From here, you can configure and monitor virtually every aspect of the Thecus IP storage from anywhere on the network.

My Favorite

The user interface with "My Favorite" shortcut is allowed user to designate often used items and have them display on the main screen area. The figure below displays system favorite functions.

Administrators can add or remove favorite functions to My Favorites by right clicking the mouse on the menu tree.

The other way administrators can add favorite functions is by clicking the "Add Favorite" icon in each function screen. Please refer figure below in red circuit icon.

To return to the favorite screen, simply click "Home" located at the left hand corner of the main screen.

Menu Bar

The **Menu Bar** is where you will find all of the information screens and system settings of Thecus IP storage. The various settings are placed in the following groups on the menu bar:

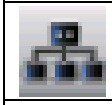
Menu Bar	
Item	**Description**
System Information	Current system status of the Thecus IP storage.
System Management	Various Thecus IP storage system settings and information.
System Network	Information and settings for network connections, as well as various services of the Thecus IP storage.
Storage	Information and settings for storage devices installed into the Thecus IP storage.
User and Group Authentication	Allows configuration of users and groups.
Network Service	
Application Server	Printer Server and iTunes Server to set up of the Thecus IP storage.
Module Management	System and user Module to install of the Thecus IP storage.
Backup	Category of Backup Features set up of the Thecus IP storage.

Moving your cursor over any of these items will display the dropdown menu selections for each group.

In the following sections, you will find detailed explanations of each function, and how to configure your Thecus IP storage.

Message Bar

You can get information about system status quickly by moving mouse over.

Message Bar		
Item	**Status**	**Description**
	RAID Information.	Display the status of created RAID volume. Click to go to RAID information page as short cut.
	Disks Information.	Display the status of disks installed in the system. Click to go to Disk information page as short cut.
	FAN.	Display system FAN Status. Click to go to System Status page as short cut.
	Network.	Green: Connection to network is normal. Red: abnormal connection to the network
	Temperature	Display system temperature, click to go to System Status page as shot cut.

Logout

Click to logout Web Administration Interface.

Language Selection

The Thecus IP storage supports multiple Languages, including:

- English
- Japanese
- Traditional Chinese
- Simplified Chinese
- French
- German
- Italian
- Korean
- Spanish
- Russia
- Polish
- Portugal

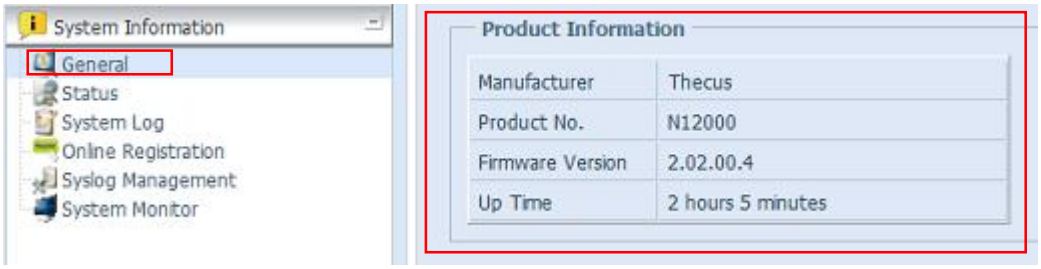
On the menu bar, click **Language** and the **selection** list appears. This user interface will switch to selected Language for Thecus IP storage.

System Information

Information provides viewing on current Product info, System Status, Service Status and Logs.
The menu bar allows you to see various aspects of the Thecus IP storage. From here, you can discover the status of the Thecus IP storage, and also other details.

System Information

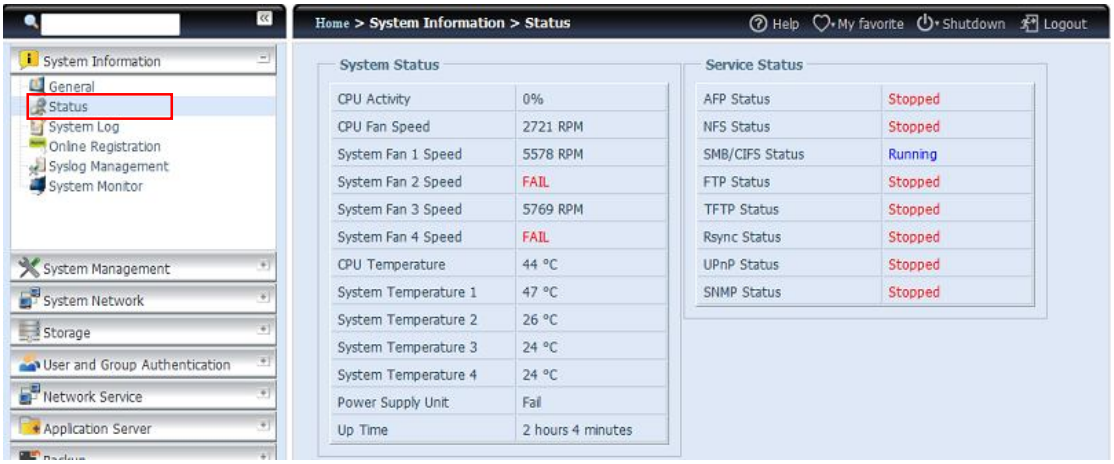
Once you login, you will first see the basic **system Information** screen providing **Manufacturer**, **Product No.**, **Firmware Version**, and **System Up Time** information.



System Information	
Item	**Description**
Manufacturer	Displays the name of the system manufacturer.
Product No.	Shows the model number of the system.
Firmware version	Shows the current firmware version.
Up time	Displays the total run time of the system.

System/Service Status

From the **System Information** menu, choose the ***Status*** item, **System Status** and **Service Status** screens appear. These screens provide basic system and service status information.



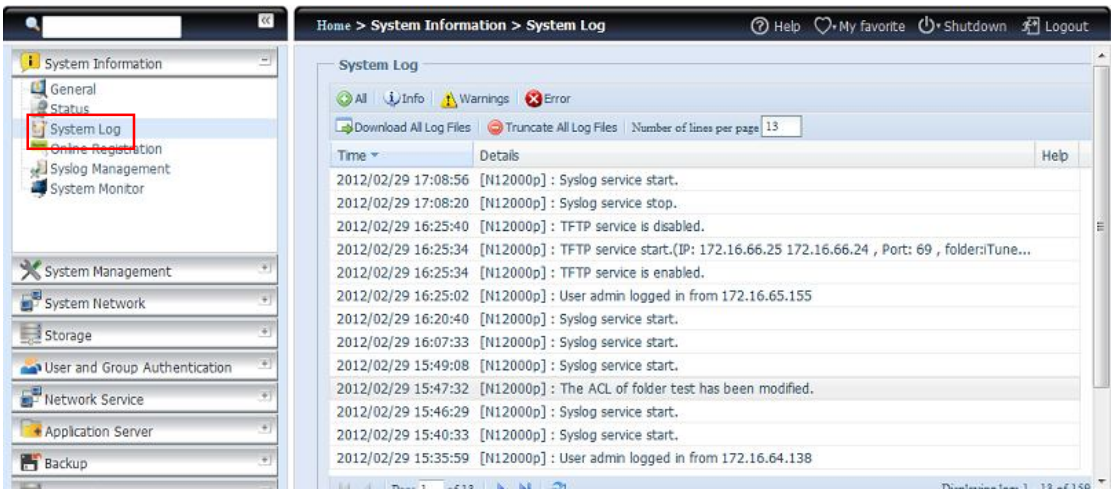
System Status	
Item	**Description**
CPU Activity	Displays current CPU workload of the Thecus IP storage.
CPU Fan Speed	Displays current CPU fan status.

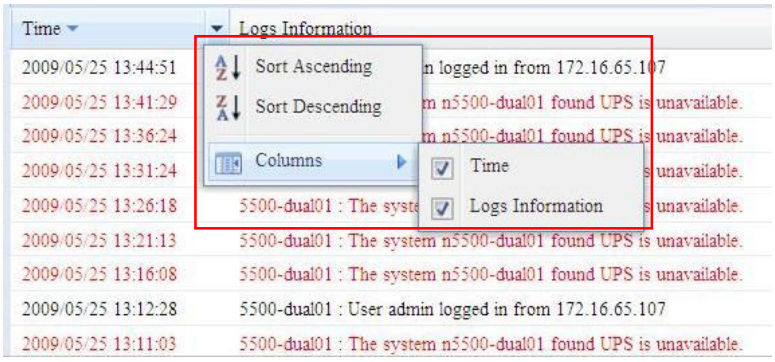
System Fan 1 Speed	Displays current System fan (left 1) status
System Fan 2 Speed	Displays current System fan (left 2) status
System Fan 3 Speed	Displays current System fan (left 3) status (Depend on model)
System Fan 4 Speed	Displays current System fan (left 4) status (Depend on model)
CPU Temperature	Displays current CPU Temperature.
System Temperature 1	Displays current System temperature in position 1
System Temperature 2	Displays current System temperature in position 2
System Temperature 3	Displays current System temperature in position 3
System Temperature 4	Displays current System temperature in position 4
System Fan Speed	Displays the current status of the system fan.
Up Time	Shows how long the system has been up and running.

Service Status	
Item	**Description**
AFP Status	The status of the Apple Filing Protocol server.
NFS Status	The status of the Network File Service Server.
SMB/CIFS Status	The status of the SMB/CIFS server.
FTP Status	The status of the FTP server.
TFTP Status	The status of the TFTP server.
Rsync Status	The status of the Rsync server.
UPnP Status	The status of the UPnP service.
SNMP	The status of the SNMP service.

Logs

From the **System Information** menu, choose the **System Logs** item and the **System Logs** screen appears. This screen shows a history of system usage and important events such as disk status, network information, and system booting. See the following table for a detailed description of each item:


Home > System Information > System Log
Help
My favorite
Shutdown
Logout
System Information
General
Status
System Log
Online Registration
Syslog Management
System Monitor
System Management
System Network
Storage
User and Group Authentication
Network Service
Application Server
Backup
System Log
All
Info
Warnings
Error
Download All Log Files
Truncate All Log Files
Number of lines per page 13
Time
Details
Help
2012/02/29 17:08:56 [N12000p] : Syslog service start.
2012/02/29 17:08:20 [N12000p] : Syslog service stop.
2012/02/29 16:25:40 [N12000p] : TFTP service is disabled.
2012/02/29 16:25:34 [N12000p] : TFTP service start.(IP: 172.16.66.25 172.16.66.24 , Port: 69 , folder:iTune...
2012/02/29 16:25:34 [N12000p] : TFTP service is enabled.
2012/02/29 16:25:02 [N12000p] : User admin logged in from 172.16.65.155
2012/02/29 16:20:40 [N12000p] : Syslog service start.
2012/02/29 16:07:33 [N12000p] : Syslog service start.
2012/02/29 15:49:08 [N12000p] : Syslog service start.
2012/02/29 15:47:32 [N12000p] : The ACL of folder test has been modified.
2012/02/29 15:46:29 [N12000p] : Syslog service start.
2012/02/29 15:40:33 [N12000p] : Syslog service start.
2012/02/29 15:35:59 [N12000p] : User admin logged in from 172.16.64.138

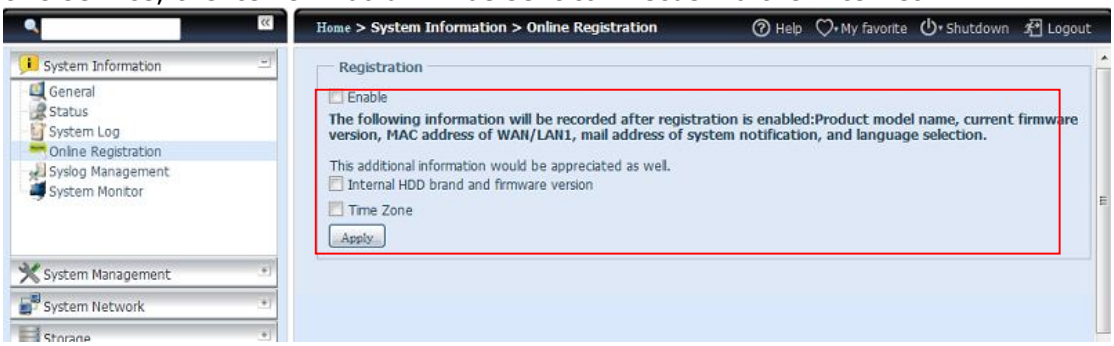


See the following table for a detailed description of each item:

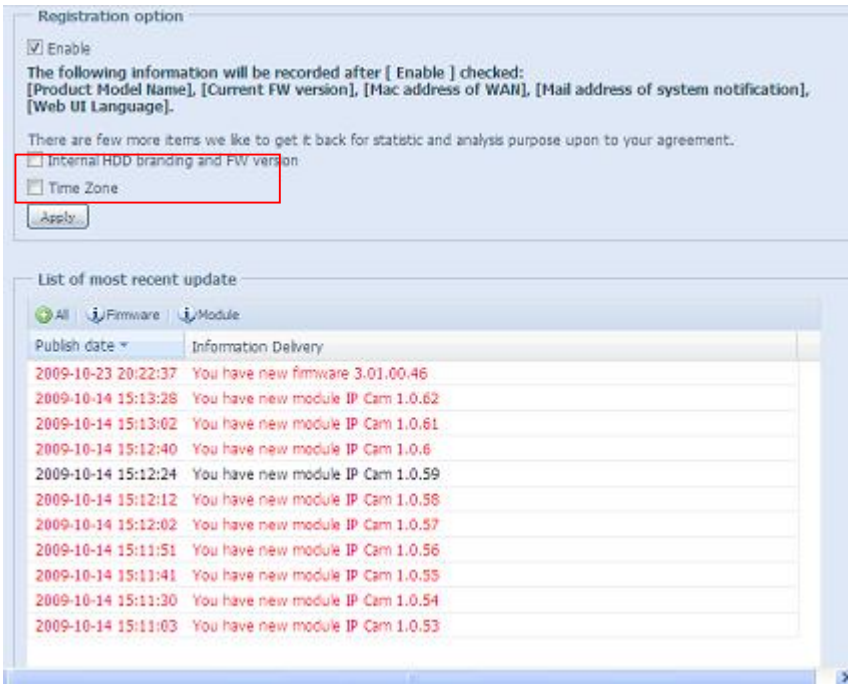
System Logs	
Item	**Description**
All	Provides all log information including system messages, warning messages and error messages.
INFO	Records information about system messages.
WARN	Shows only warning messages.
ERROR	Shows only error messages.
Download All Log File	Export all logs to an external file.
Truncate All Log File	Clear all log files.
The number of lines per page ☐	Specify desired number of lines to display per page.
Sort Ascending	Shows logs by date in ascending order.
Sort Descending	Shows logs by date in descending order.
|<< < > >>|	Use the forward (**> >>|**) and backward (**|<< <**) buttons to browse the log pages.
	Re-loading logs.

On-line Register

From the **System Information** menu, choose the **On-line Register** item and the **System On-line Register** screen appears. The on-line register service can periodically update the user when new firmware and software modules are released by Thecus. To enable this service, simply check the "Enable" check box. By enabling this service, the items in bold will be sent to Thecus via the Internet.



Other than the defined items sent upon registration, there are also two additional items: "HDD Info" and "Time Zone". These two optional items can also be sent to Thecus anonymously for analysis and statistics purposes. To send these items, simply check the desired checkboxes to help Thecus improve its products and services.

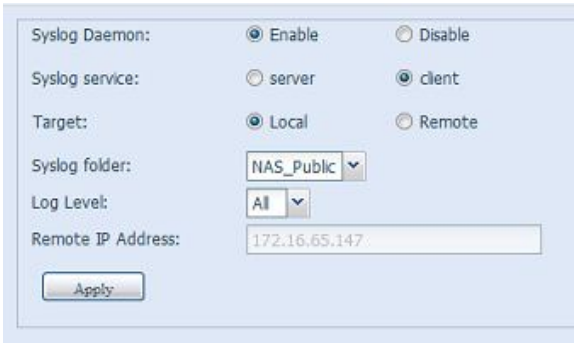

Registration option
Enable
The following information will be recorded after [Enable] checked:
[Product Model Name], [Current FW version], [Mac address of WAN], [Mail address of system notification], [Web UI Language].
There are few more items we like to get it back for statistic and analysis purpose upon to your agreement.
Internal HDD branding and FW version
Time Zone
Apply
List of most recent update
All
Firmware
Module
Publish date
Information Delivery
2009-10-23 20:22:37 You have new firmware 3.01.00.46
2009-10-14 15:13:28 You have new module IP Cam 1.0.62
2009-10-14 15:13:02 You have new module IP Cam 1.0.61
2009-10-14 15:12:40 You have new module IP Cam 1.0.6
2009-10-14 15:12:24 You have new module IP Cam 1.0.59
2009-10-14 15:12:12 You have new module IP Cam 1.0.58
2009-10-14 15:12:02 You have new module IP Cam 1.0.57
2009-10-14 15:11:51 You have new module IP Cam 1.0.56
2009-10-14 15:11:41 You have new module IP Cam 1.0.55
2009-10-14 15:11:30 You have new module IP Cam 1.0.54
2009-10-14 15:11:03 You have new module IP Cam 1.0.53

Syslog Management

Generates system log to be stored locally or remotely, it also can be chose to act as syslog server for all other devices.
These messages are stored on your NAS in: Nsync > log> messages.
Information can be obtained in two ways: locally and remotely.

Configuration with syslog server:

Configuration with syslog client and target to store locally:



Configuration with syslog client and target to store remotely:

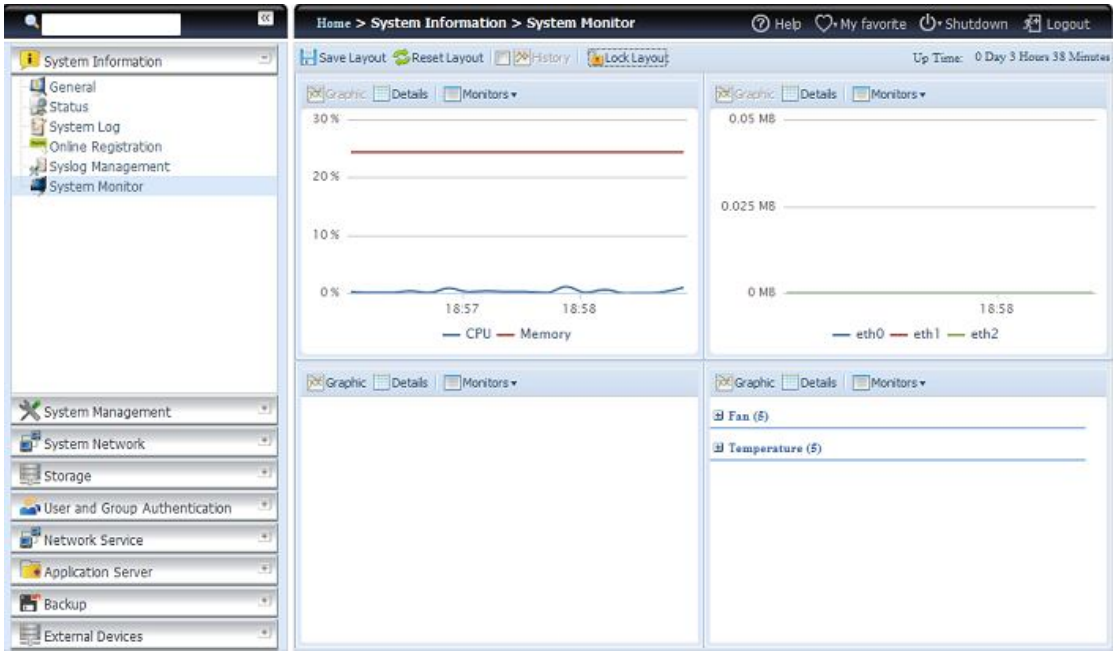
See the following table for a detailed description of each item:

Time	
Item	**Description**
Syslog Daemon	Enable/Disable syslog daemon.
Syslog service	If Server has been selected then associated syslog folder will be used to store all system logs from other NAS devices which has assigned this system for syslog server as well as syslog of this server unit. It can be seen from associated syslog folder with files "error", "Information" and "warning". If client has been selected then "Local" or "Remotely" can be choose.
Target	Choose Local then the all system log will be stored in associated syslog folder filled in from next filed. And the syslog folder will have file "messages" to store all system logs. If Remotely has selected then syslog server is needed and IP address is required.
Syslog folder	Select from drop down share list then all of system logs will stored on it. This syslog folder is applied to "syslog server" or "syslog client with local selected".
Log Level	It has 'All", "warning/error" and 'Error" 3 different level can be choose from.
Remote IP Address	Input syslog server IP address while choose store syslog info remotely.

System Monitor

The system monitor is capable to monitor system status included CPU/memory utilization, fan/temperature status, network throughput and on-line users list in varies protocols.

To monitor system status, simply click on "System Monitor" from menu tree and screen appear as below.

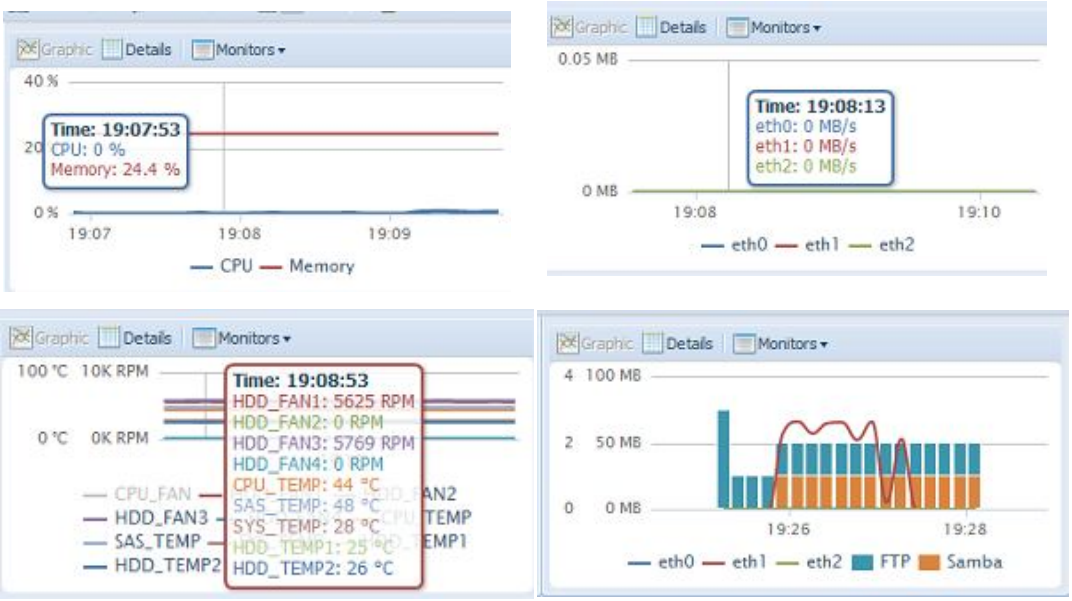


It has divided into 4 sections and each section can be choose the desired monitor items by using drop down list from "Monitors" tab. Click on items you like to monitor. It is also capable to choose from "Graphic" to display graphically or "Details" in plain text mode.

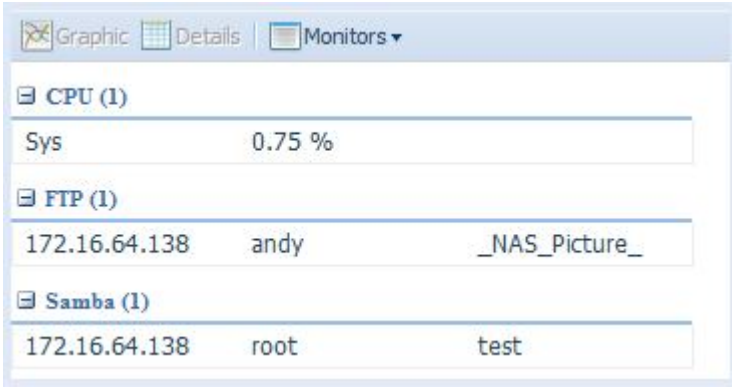
NOTE

The system monitor with graphic mode can only have 2 sections been con-current use at same time.

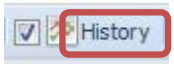
If graphic mode has choose, it could also displayed for past 3 minute's information by using click on X-axis. See example below:



For the on-line users list, system monitor will display the on-line access users and share folder has been visited.



System Monitor	
Item	**Description**
Save Layout	Saving selected monitoring items. It will keep while visiting next time.
Reset Layout	Set back to default setting with monitoring items.
History	Click on this check box and system monitor data will write to designate path of RAID volume.
Lock Layout	All of monitoring items is fixed and cannot change. Click again to unlock it.

If the History has been enabled, click on 

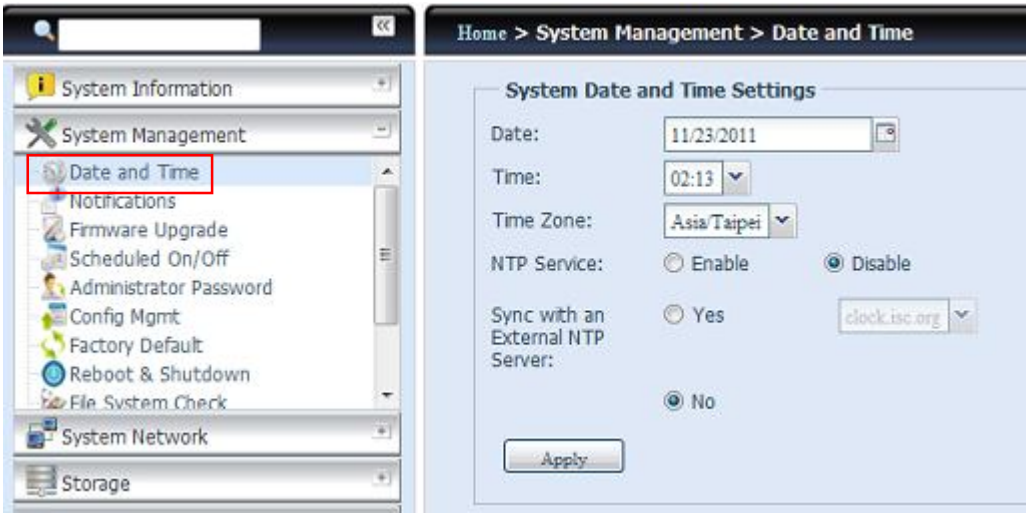
it will display system monitor with different duration for selection.

System Management

The **System Management** menu gives you a wealth of settings that you can use to configure your Thecus IP storage system administration functions. You can set up system time, system notifications, and even upgrade firmware from this menu.

Time: Setting system time

From the **time** menu, choose the **Time** item and the **Time** screen appears. Set the desired **Date**, **Time**, and **Time Zone**. You can also elect to synchronize the system time on Thecus IP storage with an **NTP (Network Time Protocol) Server**.



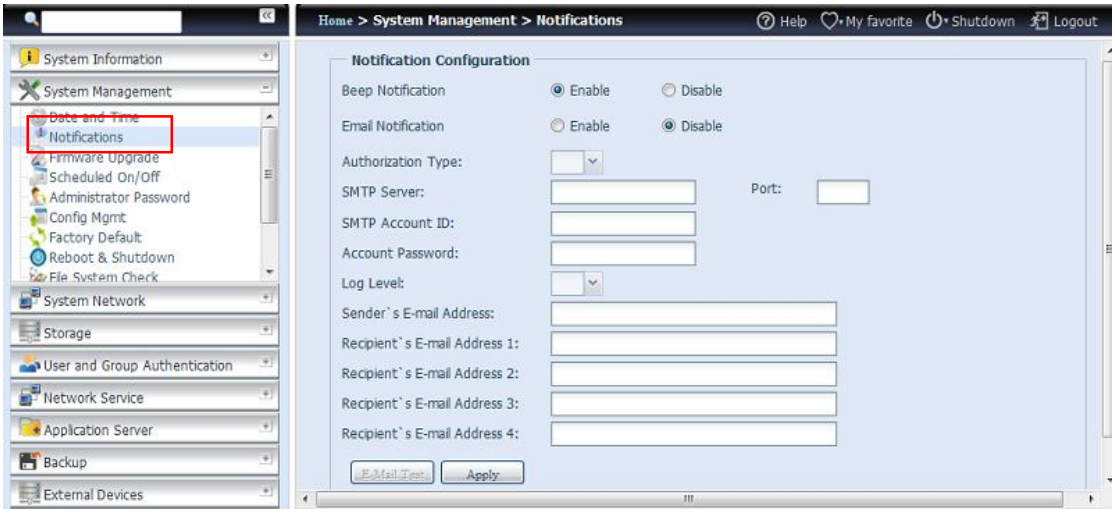
See the following table for a detailed description of each item:

Time	
Item	**Description**
Date	Sets the system date.
Time	Sets the system time.
Time Zone	Sets the system time zone.
NTP Service	Select ***Enable*** to synchronize with the NTP server. Select Disable to close the NTP server synchronization.
Sync with external NTP Server	Select **YES** to allow Thecus IP storage to synchronize with an NTP server of your choice. Press **Apply** to change.

WARNING If an NTP server is selected, please make sure your Thecus IP storage has been setup to access the NTP server.

Notification configuration

From the menu, choose the ***Notification*** item, and the **Notification Configuration** screen appears. This screen lets you have Thecus IP storage notify you in case of any system malfunction. Press ***Apply*** to confirm all settings. See following table for a detailed description of each item.



Notification Configuration	
Item	**Description**
Beep Notification	Enable or disable the system beeper that beeps when a problem

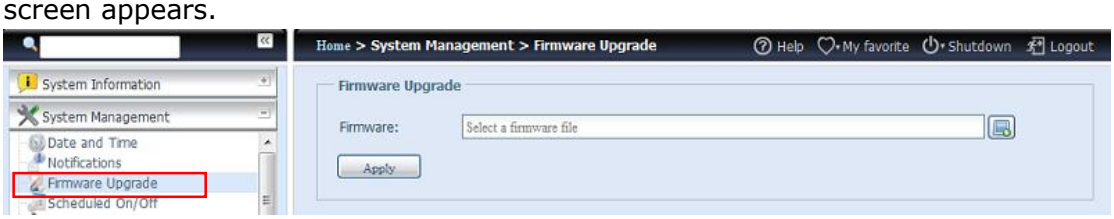
	occurs.
Email Notification	Enable or disable email notifications of system problems.
Authentication Type	Select the SMTP Server account authentication type.
SMTP Server	Specifies the hostname/IP address of the SMTP server.
Port	Specifies the port to send outgoing notification emails.
SMTP Account ID	Set the SMTP Server Email account ID.
Account Password	Enter a new password.
Log Level	Select the log level to send the e-mail out.
Sender's E-mail Address	Set email address to send email.
Receiver's E-mail Address (1,2,3,4)	Add one or more recipient's email addresses to receive email notifications.

NOTE

Consult with your mail server administrator for email server information.

Firmware Upgrade

From the menu, choose the ***Firmware Upgrade*** item and the **Firmware Upgrade** screen appears.



Follow the steps below to upgrade your firmware:

1. Use the ***Browse*** button to find the firmware file.
2. Press ***Apply***.
3. The beeper beeps and the Busy LED blinks until the upgrade is complete.

NOTE

- The beeper only beeps if it is enabled in the System Notification menu.
- Check Thecus website for the latest firmware release and release notes.
- Downgrading firmware is not permitted.

WARNING

Do not turns off the system during the firmware upgrade process.
This will lead to a catastrophic result that may render the system inoperable.

Schedule Power On/Off

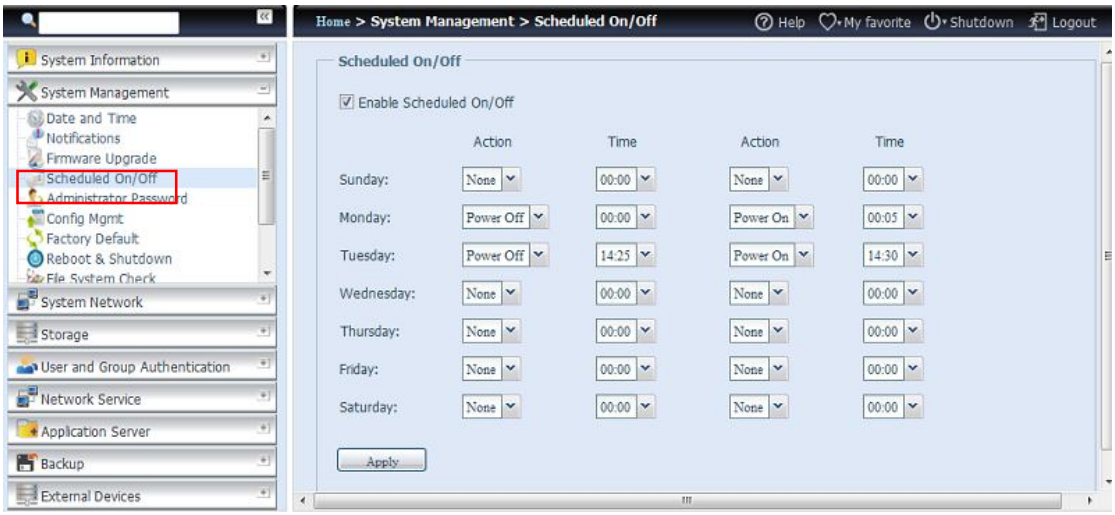
Using the Thecus IP storage System Management, you can save energy and money by scheduling the Thecus IP storage to turn itself on and off during certain times of the day.

From the menu, choose the **Schedule Power On/Off** item and the **Schedule Power On/Off** screen appears.

To designate a schedule for the Thecus IP storage to turn on and off, first enable the feature by checking the **Enable Schedule Power On/Off** checkbox.

Then, simply choose an on and off time for each day of the week that you would like to designate a schedule by using the various dropdowns.

Finally, click ***Apply*** to save your changes.



Example - Monday: On: 8:00; Off: 16:00
System will turn on at 8:00 AM on Monday, and off at 16:00 on Monday. System will turn on for the rest of the week.

If you choose an on time, but do not assign an off time, the system will turn on and remain on until a scheduled off time is reached, or if the unit is shutdown manually.

Example - Monday: On: 8:00
System will turn on at 8:00 AM on Monday, and will not shut down unless powered down manually.

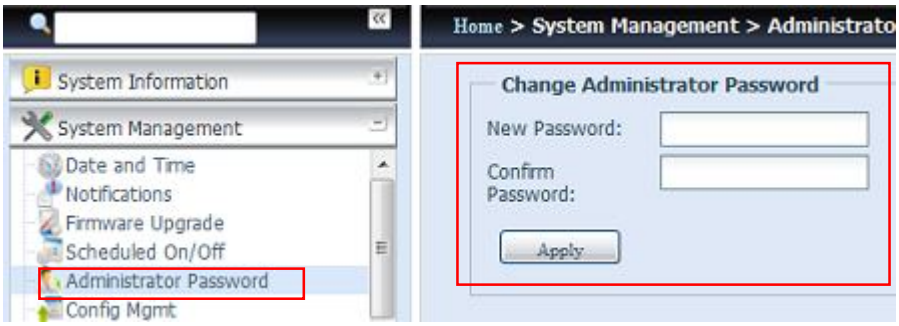
You may also choose two on times or two off times on a particular day, and the system will act accordingly.

Example - Monday: Off: 8:00; Off: 16:00
System will turn off at 8:00 AM on Monday. System will turn off at 16:00 PM on Monday, if it was on. If the system was already off at 16:00 PM on Monday, system will stay off.

Administrator Password

From the menu, choose the **Administrator Password** item and the **Change Administrator Password** screen appears. Enter a new password in the **New Password** box and confirm your new password in the **Confirm Password** box. Press ***Apply*** to confirm password changes.

There is also **password** for enter **OLED** setting you could setup here. Enter a new password in the **New Password** box and confirm your new password in the **Confirm Password** box. Press ***Apply*** to confirm password changes.

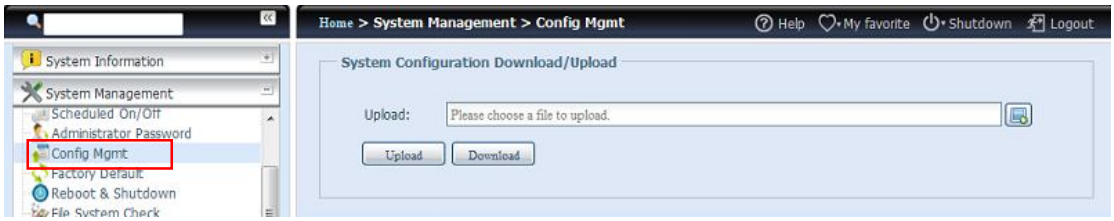


See the following table for a detailed description of each item.

Change Administrator and LCD Entry Password	
Item	**Description**
New Password	Type in a new administrator password.
Confirm Password	Type the new password again to confirm.
Apply	Press this to save your changes.

Config Mgmt

From the menu, choose the ***Config Mgmt*** item and the **System Configuration Download/Upload** screen appears. From here, you can download or upload stored system configurations.



See the following table for a detailed description of each item.

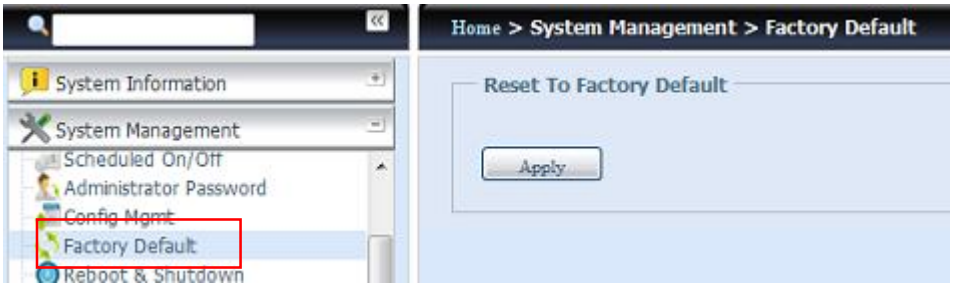
System Configuration Download/Upload	
Item	**Description**
Download	Save and export the current system configuration.
Upload	Import a saved configuration file to overwrite current system configuration.

NOTE

Backing up your system configuration is a great way to ensure that you can revert to a working configuration when you are experimenting with new system settings. The system configuration you have backup can be only restore in same firmware version. And the backup details have excluded user/group accounts.

Factory Default

From the menu, choose the ***Factory Default*** item and the **Reset to Factory Default** screen appears. Press ***Apply*** to reset Thecus IP storage to factory default settings.



WARNING Resetting to factory defaults will not erase the data stored in the hard disks, but WILL revert all the settings to the factory default values.

Reboot & Shutdown

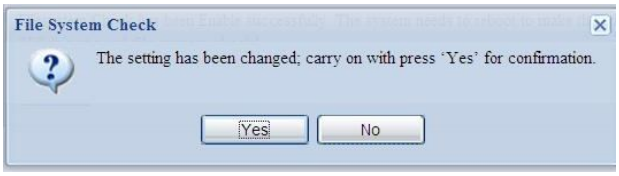
From the menu, choose **Reboot & Shutdown** item, and the **Shutdown/Reboot System** screen appears. Press ***Reboot*** to restart the system or ***Shutdown*** to turn the system off.

File System Check

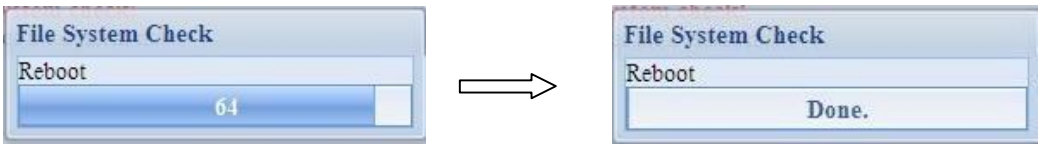
The File System Check allows you to perform a check on the integrity of your disks' file system. Under the menu, click ***File system Check*** and the **File System Check** prompt appears.

Home > System Management > File System Check
Help
My favorite
System Information
System Management
Scheduled On/Off
Administrator Password
Config Mgmt
Factory Default
Reboot & Shutdown
File System Check
File System Check
The file system has been checked successfully. Reboot the system make the changes effective.
Encrypted RAID does not support file system checks!
Press [Apply] to reboot the system now.
Apply

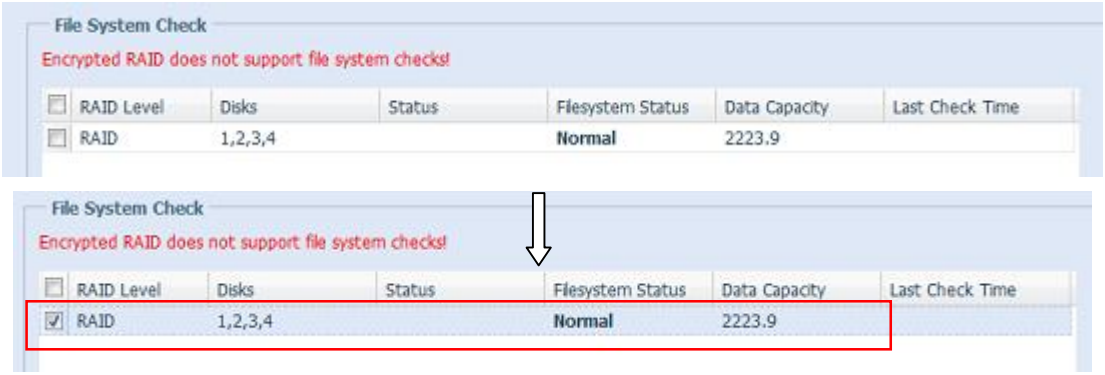
To perform a file system check, click ***Apply***.
Once clicked, the following prompt will appear:



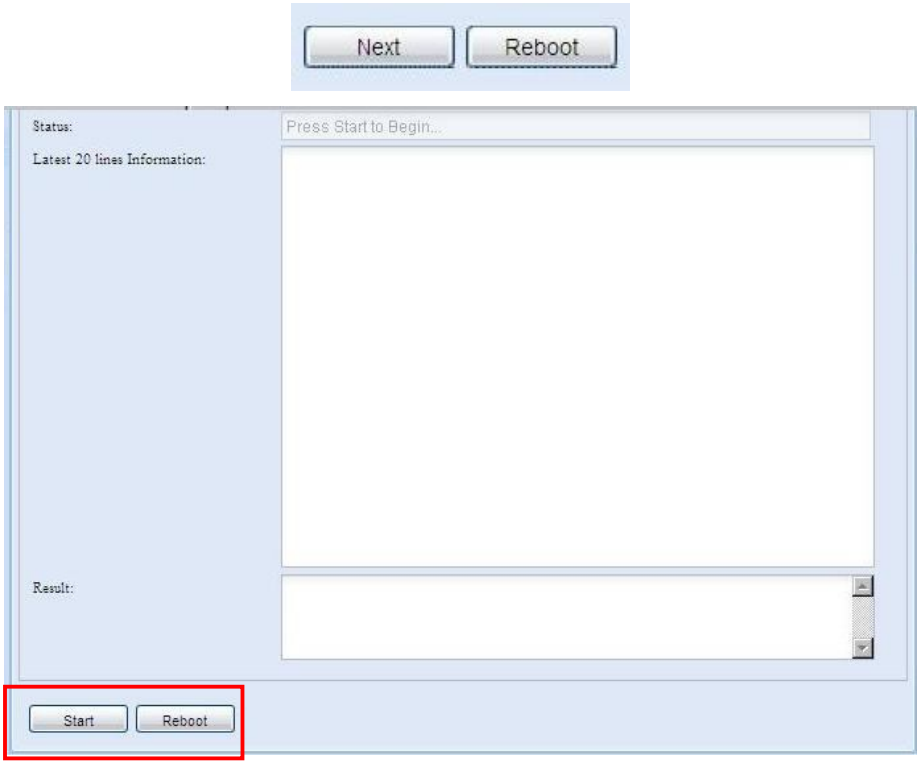
Click ***Yes*** to reboot the system.



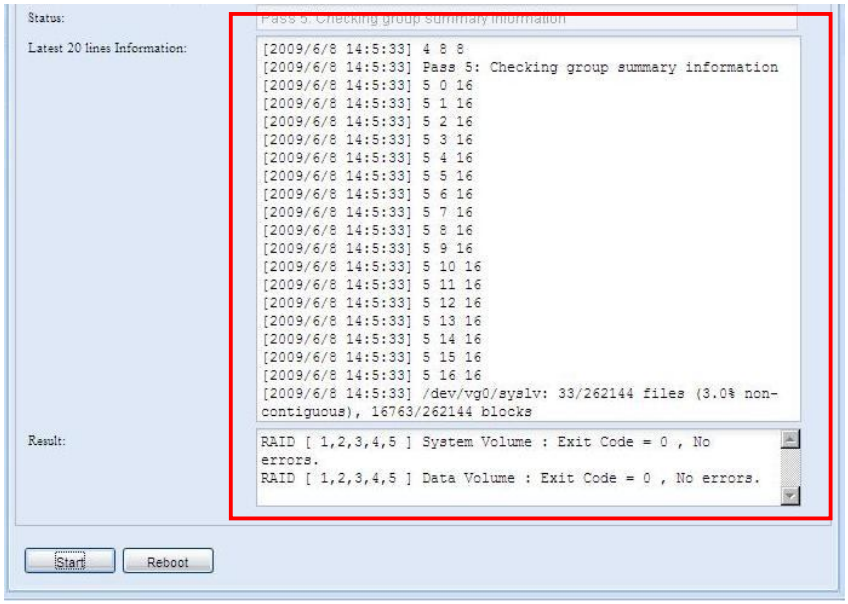
Once the system has rebooted, you will be returned to the **File System Check** prompt. There you will see the available RAID volumes to run the file system check. Check the desired RAID volumes and click ***Next*** to proceed with the file system check. Click ***Reboot*** to reboot without running the check.



Once you click ***Next***, you will see the following screen:



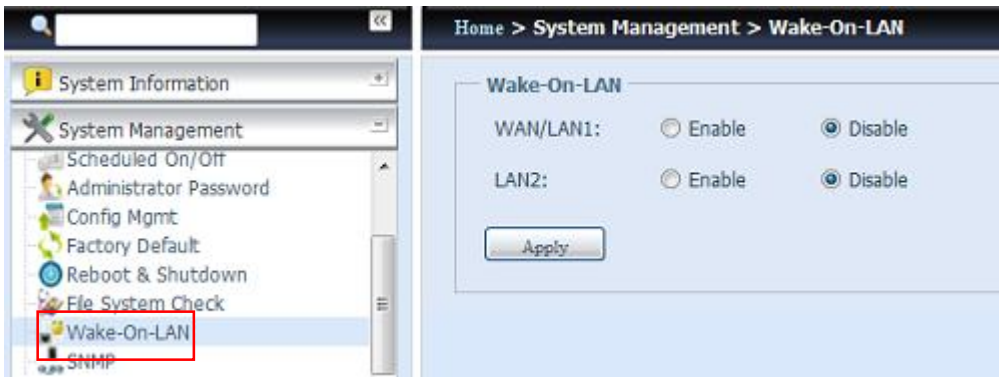
Click ***Start*** to begin the file system check. Click ***Reboot*** to reboot the system. When the file system check is run, the system will show 20 lines of information until it is complete. Once complete, the results will be shown at the bottom.



NOTE The system must be rebooted before Thecus IP storage can function normally after file system check complete.

Wake-Up On LAN (WOL)

The Thecus IP storage has the ability to be awoken from sleep mode via WAN/LAN1 or LAN2 port.



From the menu, choose the ***WOL*** item, and the **Wake-up On LAN** screen appears. From here, you can **Enable** or **Disable**.

Wake-up On LAN Configuration	
Item	**Description**
WAN/LAN1	**Enable** or **Disable** WOL service from WAN/LAN1
LAN2	**Enable** or **Disable** WOL service from LAN2
Apply	Click ***Apply*** to save changes.

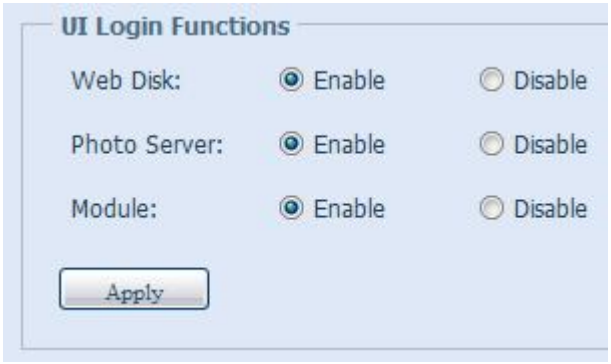
SNMP Support

From the menu, choose the **SNMP** item and the **SNMP Support** screen appears. You could enable the SNMP function and filled in the related information in each fields. With the SNMP management software could get system basic information.

From the menu, choose the **SNMP** item, and the **SNMP Support** screen appears. From here, you can **Enable** or **Disable**.

UI Login Function

Adjusts UI Login Configuration settings, you can enable/disable the Web Disk, Photo Server and modules functions, according to your needs.

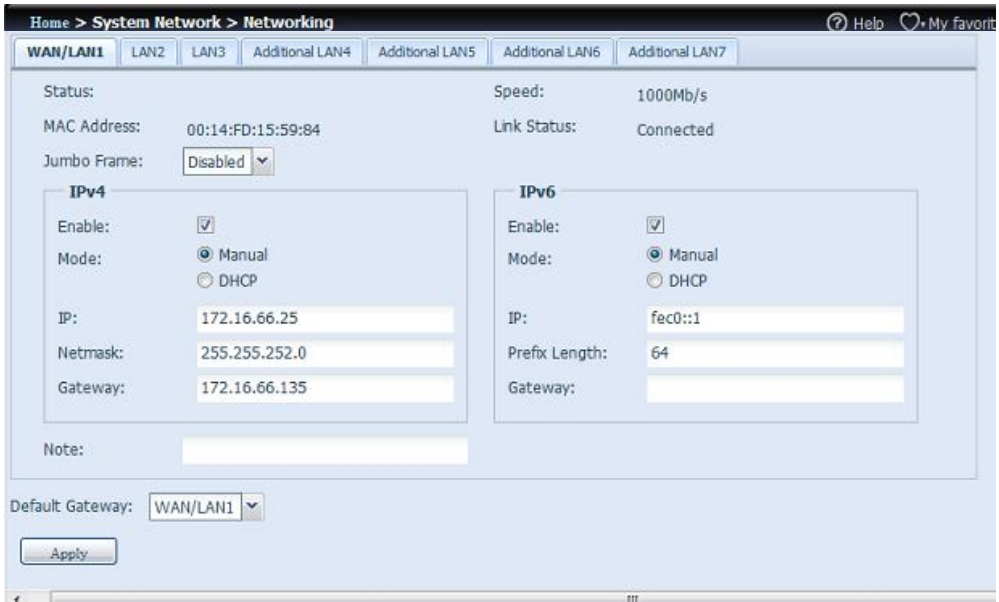


System Network

Use the **System Network** menu to make network configuration settings for on board network ports or additional NIC as well as DHCP and link aggregation.

Networking

From the **System Network** menu, choose ***Networking***, and the **Networking Configuration** screen appears. This screen displays the network parameters of the global setting and available network connection. You may change any of these items and press ***Apply*** to confirm your settings. See a description of each item in the following table:



The available system network ports are coming from embedded of system and additionally added from reserved PCI-e slot with associated compatible list. Therefore, the screen shows above is example from Thecus N16000 with 3 GbE NIC on board and installed additional Intel PRO/1000 PT quad port NIC, it makes total 7 NIC ports for the system.

Network Configuration (Global parameter)	
Item	**Description**
Host name	Host name that identifies the Thecus IP storage on the network.
Domain name	Specifies the domain name of Thecus IP storage.
WINS Server	To set a server name for NetBIOS computer.
DNS Mode	Select the DNS server is coming from DHCP server or manual input. It has totally 3 DNS servers can be input. If choose DNS server is granted from DHCP server then it will refer to WAN/LAN1 port.
DNS Server 1,2,3	Domain Name Service (DNS) server IP address.
Network Configuration (NIC port)	
Link speed	Display associated NIC port link speed.
Link status	Display associated NIC port link status.
MAC address	MAC address of the network interface.
Jumbo Frame Support	Enable or disable Jumbo Frame Support of associate interface on your Thecus IP storage.
IPv4/IPv6	Click to enable IPv4/IPv6 for TCP/IP. The default is IPv4 enabled.
Mode	It can choose a static IP or Dynamic IP.
IP	IP address of associate NIC interface.
Netmask/Prefix Length	Input netmask for IPv4 and Prefix length for IPv6.
Gateway	Gateway for associate NIC.
Default gateway	It can be choose from drop down list of default gateway been used for the Thecus IP storage.

NOTE

- Only use Jumbo Frame settings when operating in a Gigabit environment where all other clients have Jumbo Frame Setting enabled.
- A correct DNS setting is vital to networks services, such as SMTP and NTP.

WARNING

Most Fast Ethernet (10/100) Switches/Routers do not support Jumbo Frame and you will not be able to connect to your Thecus NAS after Jumbo Frame is turned on.

DHCP/RADVD

From the **System Network** menu, choose ***DHCP/RADVD***, and the **DHCP/RADVD Configuration** screen appears. This screen displays available NIC status. And for each NIC it can be configured to act as DHCP/RADVD server if it is static IP been setup.

DHCP/RADVD Server Configuration

A DHCP/RADVD server can be configured to assign IP addresses (IPv4) or Prefix (IPv6) to devices connected to the associated NIC port.

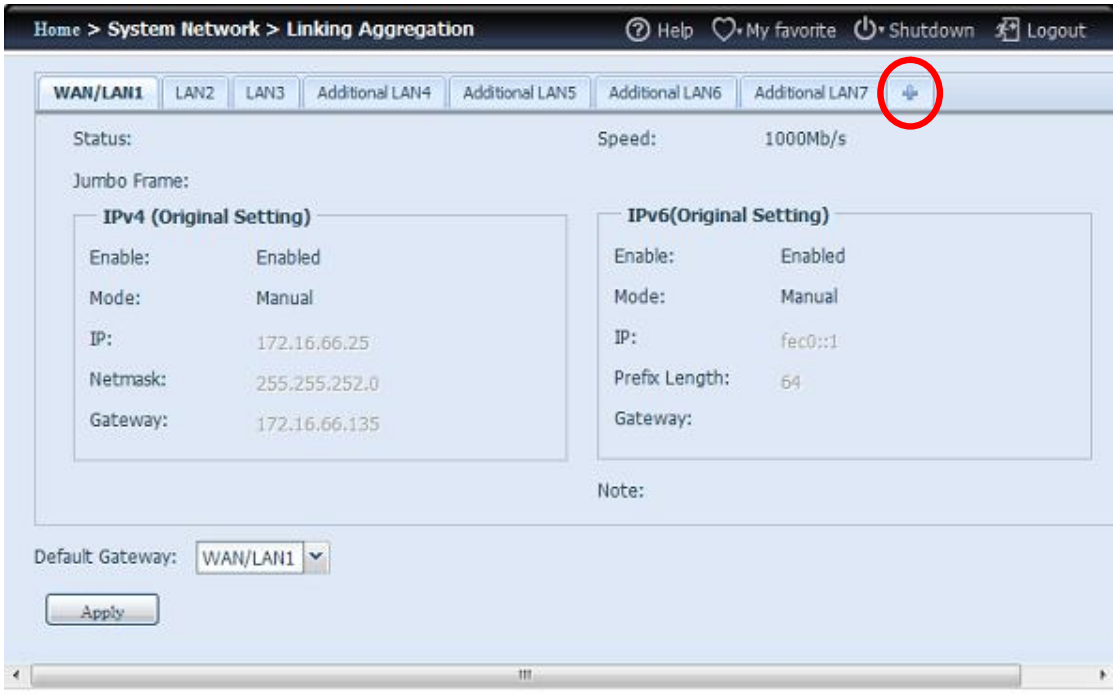
DHCP Configuration	
Item	**Description**
DHCP/RADVD Server	Enable or disable the DHCP/RADVD server to automatically assign IP address to PCs connected to associate NIC interface.
Start IP (IPv4)	Specifies the lower IP address of the DHCP range.
End IP in (IPv4)	Specifies the highest IP address of the DHCP range.

Default Gateway (IPv4)	Specifies gateway for the DHCP server service.
DNS Server 1,2,3 (IPv4)	Displayed the DNS server IP address.
Prefix (IPv6)	Specifies prefix
Prefix Length (IPv6)	Specifies prefix length

WARNING The IP address of associate NIC should not be in the range of the Start IP address and End IP address (IPv4).

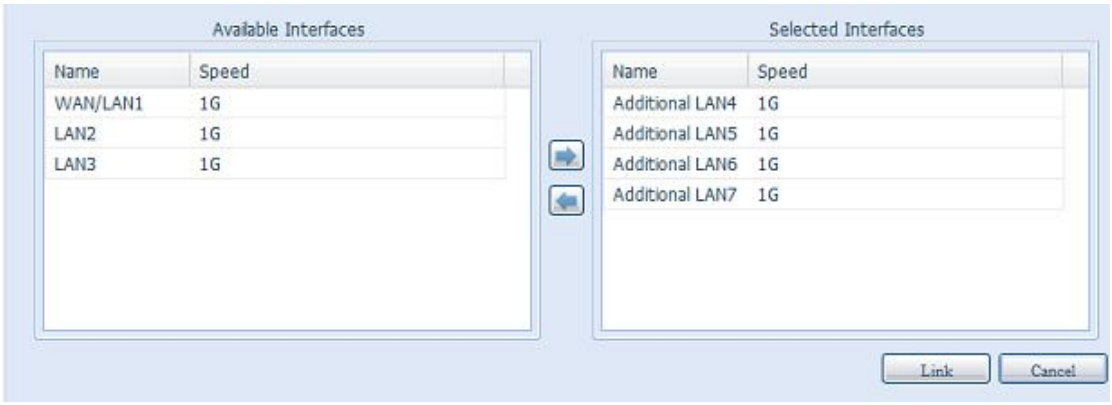
Linking Aggregation

The Thecus IP storage supports link aggregation from either on board network port or additional NIC. Simple click on "+" as screen shot indicate below.

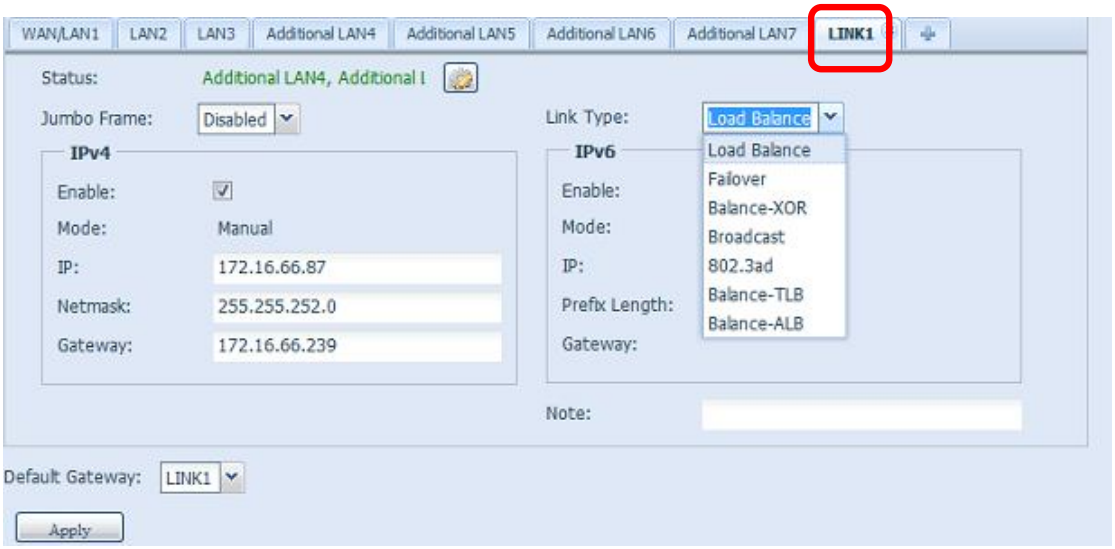


The associated screen shot will appear after "+" clicked.

Select from available network port then move over to selected box.

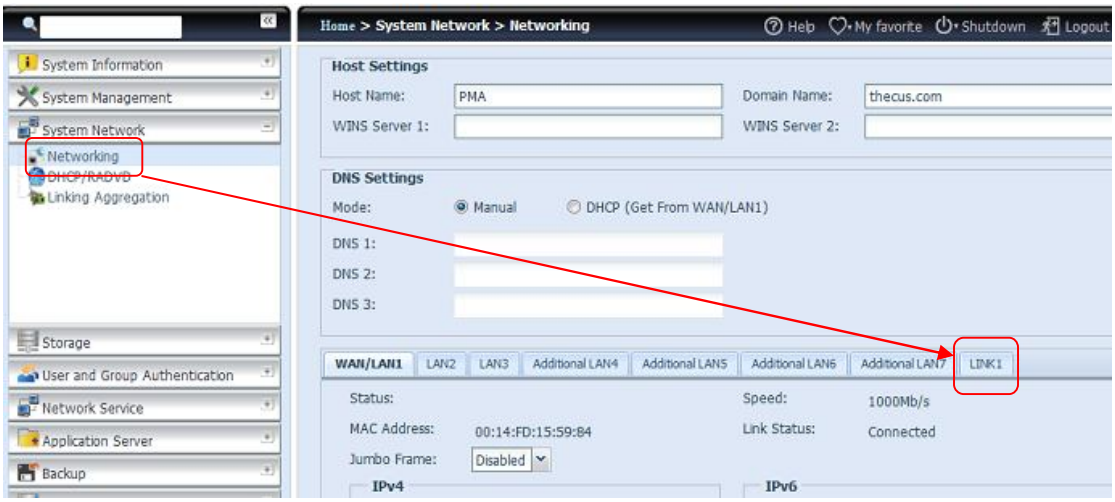


Click "Link" to confirm the selection. Then related screen will appear for more setting required to complete link aggregation configuration.

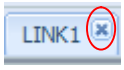


Link1 Configuration	
Status	Specific the network ports been used with associate link aggregation. Click on to modify selected network ports.
Jumbo Frame Support	Enable or disable Jumbo Frame Support of associate interface on your Thecus IP storage.
Link Type	Select from drop down list for desired mode.
IPv4/IPv6	Click to enable IPv4/IPv6 for TCP/IP. The default is IPv4 enabled.
Mode	It has to be static IP with link aggregation been used.
IP	IP address of link aggregation. .
Netmask/Prefix Length	Input netmask for IPv4 and Prefix length for IPv6.
Gateway	Gateway for associate link aggregation
Default gateway	It can be choose from drop down list of default gateway been used for the Thecus IP storage.

Now under the networking, it will have "Link1" appear from network title bar.



To modify or delete LINK1, go to Link Aggregation setting page. Click on

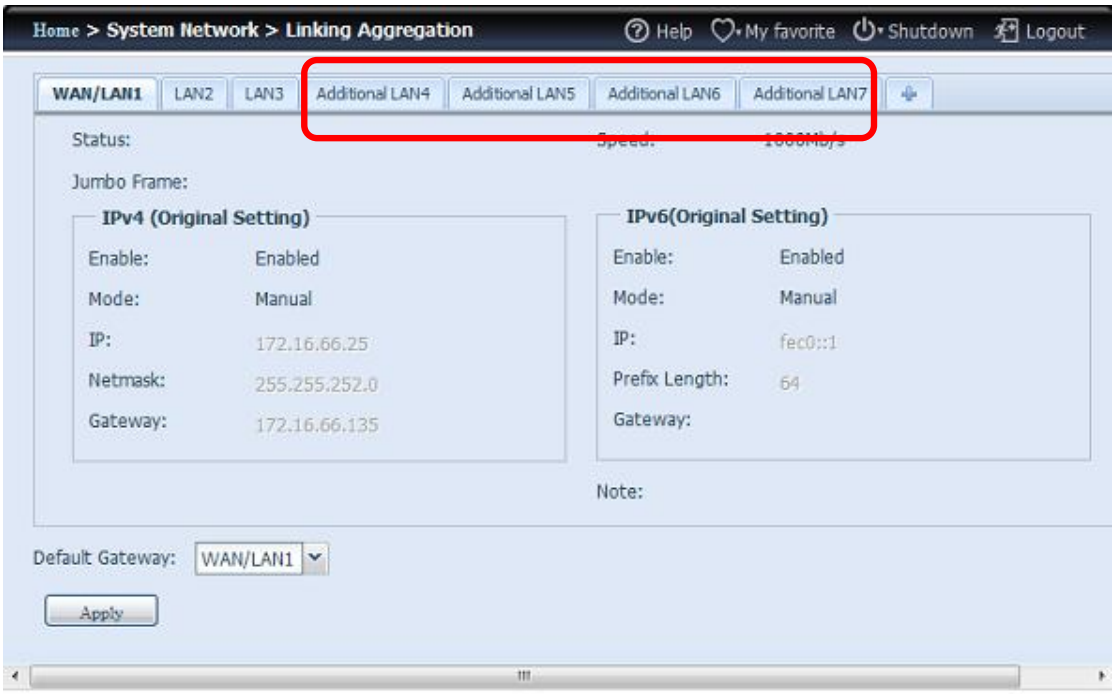
to modify setting or click on 

to delete this link aggregation. It can certainly create 2nd link aggregation by click if there are still available network ports.

Additional LAN

Other than on-board LAN port, Thecus IP storage supports additional NIC to be added in its available PCI-e slot. For the details of additional NIC support list please visit Thecus website.
http://www.thecus.com/sp_comlist.php

Once the additional NIC has installed into Thecus IP storage, the "Additional LANx" is appeared under "Networking" category. Click the associated NIC to setup the details. Here is example to have Intel PRO/1000 PT Quad port installed from screen shot below.



Storage Management

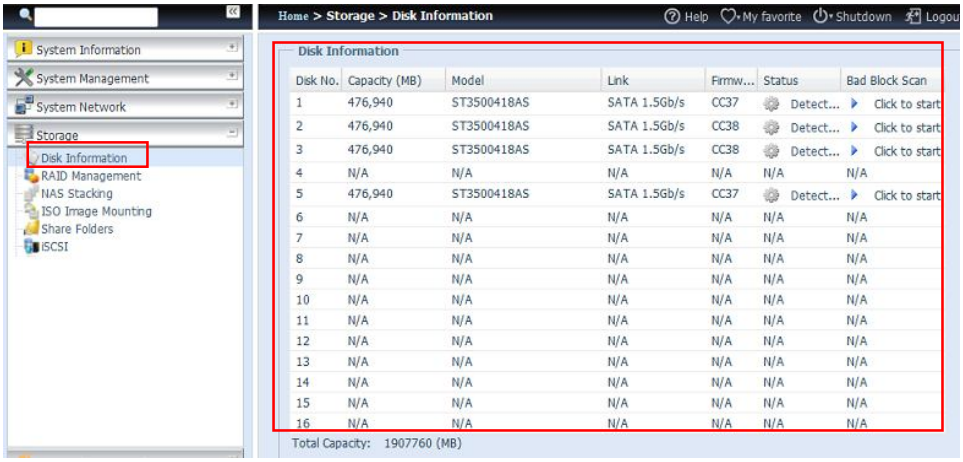
The **Storage** menu displays the status of storage devices installed in the Thecus IP storage, and includes storage configuration options such as RAID and disk settings, folder configuration, iSCSI and ISO Mount.

Disks Information

From the **Storage** menu, choose the ***Disks*** item and the **Disks Information** screen appears. From here, you can see various items about installed SATA/SAS hard disks. Blank lines indicate that hard disk is not currently installed in that particular disk slot.

NOTE

- The screen shot below just example from Thecus IP Storage. The disk slots can from 8,12 to 16 depend on the model of Thecus IP storage.


Home > Storage > Disk Information
Help
My favorite
Shutdown
System Information
System Management
System Network
Storage
Disk Information
RAID Management
NAS Stacking
ISO Image Mounting
Share Folders
iSCSI
Disk Information
Disk No. | Capacity (MB) | Model | Link | Firmw... | Status | Bad Block Scan
1 | 476,940 | ST3500418AS | SATA 1.5Gb/s | CC37 | Detect... | Click to start
2 | 476,940 | ST3500418AS | SATA 1.5Gb/s | CC38 | Detect... | Click to start
3 | 476,940 | ST3500418AS | SATA 1.5Gb/s | CC38 | Detect... | Click to start
4 | N/A | N/A | N/A | N/A | N/A
5 | 476,940 | ST3500418AS | SATA 1.5Gb/s | CC37 | Detect... | Click to start
6 | N/A | N/A | N/A | N/A | N/A
7 | N/A | N/A | N/A | N/A | N/A
8 | N/A | N/A | N/A | N/A | N/A
9 | N/A | N/A | N/A | N/A | N/A
10 | N/A | N/A | N/A | N/A | N/A
11 | N/A | N/A | N/A | N/A | N/A
12 | N/A | N/A | N/A | N/A | N/A
13 | N/A | N/A | N/A | N/A | N/A
14 | N/A | N/A | N/A | N/A | N/A
15 | N/A | N/A | N/A | N/A | N/A
16 | N/A | N/A | N/A | N/A | N/A
Total Capacity: 1907760 (MB)

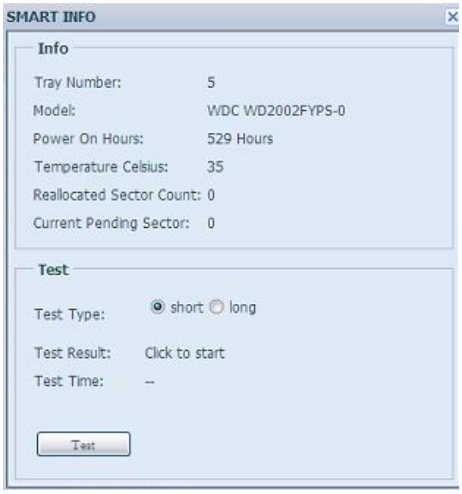
Disks Information	
Item	**Description**

Disk No.	Indicates disk location.
Capacity	Shows the SATA hard disk capacity.
Model	Displays the SATA hard disk model name.
Link	Displays the hard disk interface and link speed
Firmware	Shows the SATA hard disk firmware version.
Status	Indicates the status of the disk.
Bad Block scan	Yes to start scan Bad Block.

S.M.A.R.T. Information

On the **Disks Information** screen, the status of each disk will be displayed in the **Status** column. Clicking on an ***OK*** or ***Warning*** link will display the **S.M.A.R.T Information** window for that particular disk.

You may also perform disk SMART test (not apply for SAS HDD), simply to click "Test" to start with. The result is only for reference and system will not take any action from its result.



S.M.A.R.T. Information	
Item	**Description**
Tray Number	Tray the hard disk is installed in.
Model	Model name of the installed hard disk.
Power ON Hours	Count of hours in power-on state. The raw value of this attribute shows total count of hours (or minutes, or seconds, depending on manufacturer) in power-on state.
Temperature Celsius	The current temperature of the hard disk in degrees Celsius
Reallocated Sector Count	Count of reallocated sectors. When the hard drive finds a read/write/verification error, it marks this sector as "reallocated" and transfers data to a special reserved area (spare area). This process is also known as remapping and "reallocated" sectors are called remaps. This is why, on a modern hard disks, you can not see "bad blocks" while testing the surface - all bad blocks are hidden in reallocated sectors. However, the more sectors that are reallocated, the more a decrease (up to 10% or more) can be noticed in disk read/write speeds.
Current Pending Sector	Current count of unstable sectors (waiting for remapping). The raw value of this attribute indicates the total number of sectors waiting for remapping. Later, when some of these sectors are read successfully, the value is decreased. If errors still occur when reading sectors, the hard drive will try to restore the data, transfer

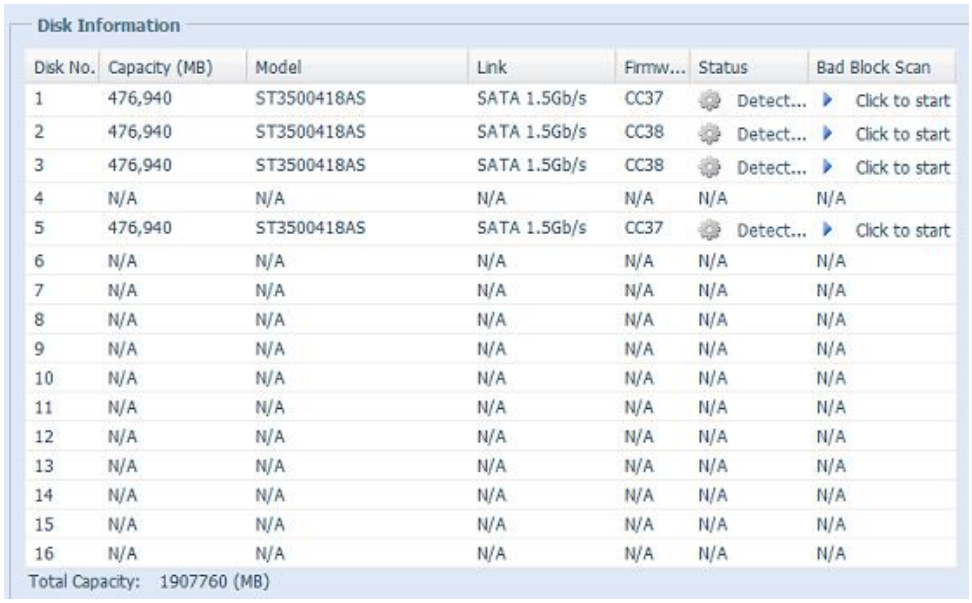
	it to the reserved disk area (spare area), and mark this sector as remapped. If this attribute value remains at zero, it indicates that the quality of the corresponding surface area is low.
Test Type	Set short or long time to test.
Test Result	Result of the test.
Test Time	Total time of the test.

NOTE

If the Reallocated Sector Count > 32 or Current Pending Sector of a hard disk drive > 0 , the status of the disk will show "Warning". This warning is only used to alert the system administrator that there are bad sectors on the disk, and they should replace those disks as soon as possible.

Bad Block Scan

On the **Disks Information** screen, you may also perform disk bad block scan, simply to click "Click to start" to start with. The result is only for reference and system will not take any action from its result.

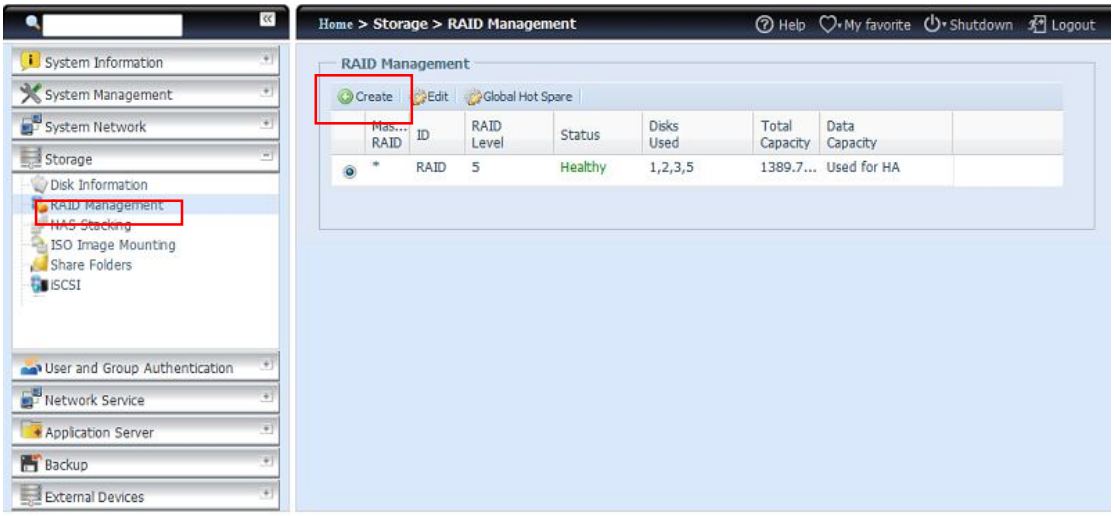

Disk Information
Disk No. Capacity (MB) Model Link Firmw... Status Bad Block Scan
1 476,940 ST3500418AS SATA 1.5Gb/s CC37 Detect... Click to start
2 476,940 ST3500418AS SATA 1.5Gb/s CC38 Detect... Click to start
3 476,940 ST3500418AS SATA 1.5Gb/s CC38 Detect... Click to start
4 N/A N/A N/A N/A N/A N/A
5 476,940 ST3500418AS SATA 1.5Gb/s CC37 Detect... Click to start
6 N/A N/A N/A N/A N/A N/A
7 N/A N/A N/A N/A N/A N/A
8 N/A N/A N/A N/A N/A N/A
9 N/A N/A N/A N/A N/A N/A
10 N/A N/A N/A N/A N/A N/A
11 N/A N/A N/A N/A N/A N/A
12 N/A N/A N/A N/A N/A N/A
13 N/A N/A N/A N/A N/A N/A
14 N/A N/A N/A N/A N/A N/A
15 N/A N/A N/A N/A N/A N/A
16 N/A N/A N/A N/A N/A N/A
Total Capacity: 1907760 (MB)

The testing result will be stay till system reboot with "Yet to start" displayed as default.

RAID Information

From the **Storage** menu, choose the ***RAID*** item and the **RAID Information** screen appears.

This screen lists the RAID volumes currently residing on the Thecus IP storage. From this screen, you can get information about the status of your RAID volumes, as well as the capacities allocated for data.



RAID Information	
Item	**Description**
Master RAID	The RAID volume currently designated as the Master RAID volume.
ID	ID of the current RAID volume. **NOTE: All RAID IDs must be unique.**
RAID Level	Shows the current RAID configuration.
Status	Indicates status of the RAID. Can read either ***Healthy***, ***Degraded***, or ***Damaged***.
Disks Used	Hard disks used to form the current RAID volume.
Total Capacity	Total capacity of the current RAID.
Data Capacity	Indicates the used capacity and total capacity used by user data.

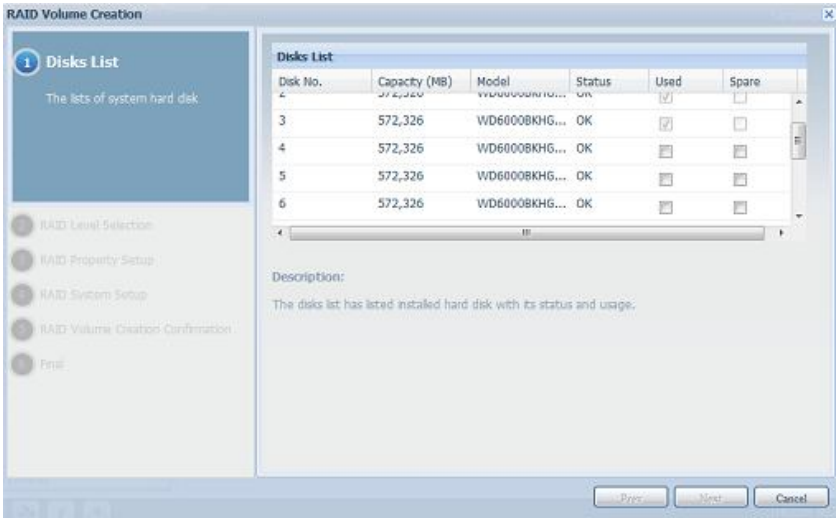
Create a RAID

On the **RAID Information** screen, press the ***create*** button to go to the **CREATE RAID** screen. In addition to RAID disk information and status, this screen lets you make RAID configuration settings.
Using **Create RAID**, you can select stripe size, choose which disks are RAID disks or the Spare Disk. .

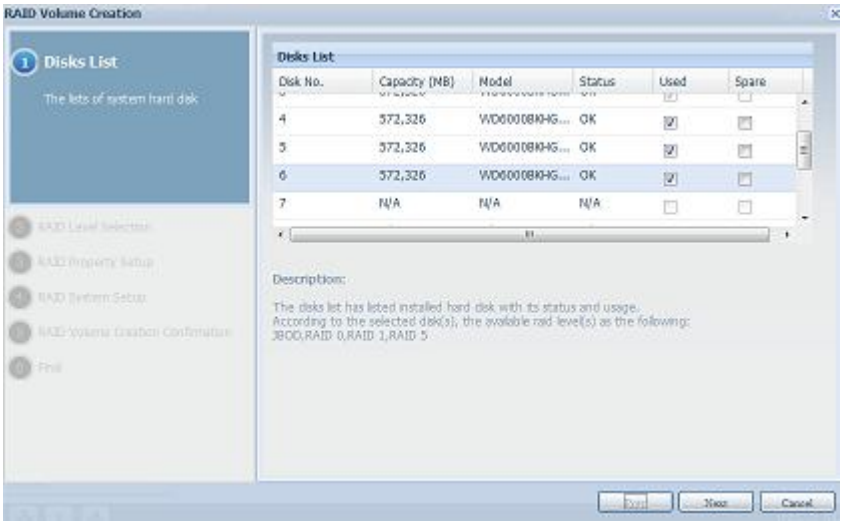
RAID Configurations	
Item	**Description**
Disk No.	Number assigned to the installed hard disks.
Capacity (MB)	Capacity of the installed hard disks.
Model	Model number of the installed hard disks.
Status	Status of the installed hard disks.
Used	If this is checked, current hard disk is a part of a RAID volume.
Spare	If this is checked, current hard disk is designated as a spare for a RAID volume.
Master RAID	Check a box to designate this as the Master RAID volume. See the **NOTE** below for more information.
Stripe Size	This sets the stripe size to maximize performance of sequential files in a storage volume. Keep the 64K setting unless you require a special file storage layout in the storage volume. A larger stripe size is better for large files.
Data Percentage	The percentage of the RAID volume that will be used to store data.
Create	Press this button to configure a file system and create the RAID storage volume.

To create a RAID volume, follow the steps below:

1. On the **RAID Information** screen, clicks create.



2. On the **RAID Configuration** screen, set the RAID storage space as **JBOD**, **RAID 0**, **RAID 1**, **RAID 5**, **RAID 6, RAID 10, RAID 50** or **RAID 60** (depend on model)— see **Appendix B: RAID Basics** for a detailed description of each.



NOTE N8900/N12000/N16000 Series supports multiple RAID and is capable of creating up to five RAID volumes within a single NAS system.

3. Specify a RAID ID.

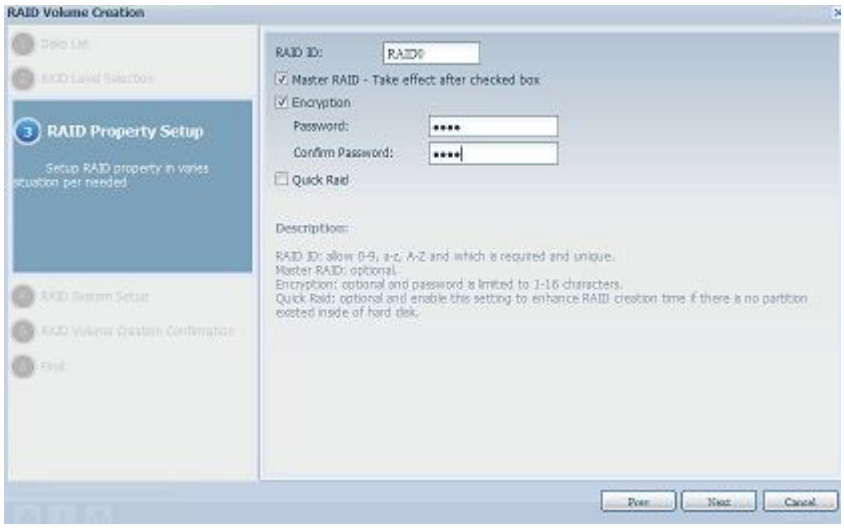
RAID Volume Creation
RAID Level Selection
System will list available RAID level can be choose from
RAID Level:
JBOD
RAID 0
RAID 1
RAID 5
Description:
JBOD: Combine multiple drives and capacities into one drive.
RAID 0: Normally used to increase performance and useful for setups such as large read-only NFS server where mounting many disks is time-consuming or impossible and redundancy is irrelevant.
RAID 1: Create an exact copy (or mirror) of a set of data on two or more disks. This is useful when

4. If this RAID volume is meant to be the Master RAID volume, tick the **Master RAID** checkbox.

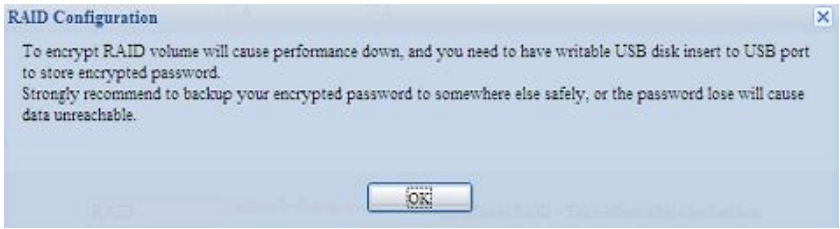
NOTE

In a multiple RAID configuration, one RAID volume must be designated as the Master RAID volume. The Master RAID volume will store all installed modules. If the Master RAID is changed to another location (i.e. assigning volume 2 to be the Master RAID volume after volume 1 had been previously assigned), then all modules must be reinstalled. In addition, all system folders that were contained on the Master RAID volume will be invisible. Reassigning this volume to be the Master RAID will make these folders visible again.

5. Selected whether the RAID volume will be encrypted or not.
   The RAID volume can protect data by using RAID Volume Encryption function to prevent the risk of data exposure. To activate this function, the **Encryption** option needs to be enabled while the RAID is created and followed by password input for identification. Also, an external writable USB disk plugged into any USB port on the system is required to save the password you have entered while the RAID volume is being created. See the screenshot below for details.



Once the **Create** button has been pressed with the **Encryption** checkbox enabled, the following message pop-up will appear for confirmation.


RAID Configuration
To encrypt RAID volume will cause performance down, and you need to have writable USB disk insert to USB port to store encrypted password.
Strongly recommend to backup your encrypted password to somewhere else safely, or the password lose will cause data unreachable.
OK

After the RAID volume has been created, you may remove this USB disk until the next time the system boots. The RAID volume can not be mounted if the USB disk with key can not be found in any system USB port when the volume is accessed. To activate the encrypted volume, plug the USB disk containing the encryption key and into any system USB port.

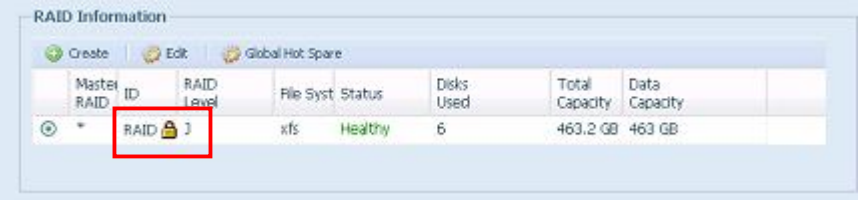
We are strongly recommended copying the RAID volume encryption key to a safe place. You can find the encryption key file from the USB disk in the following format:

(RAID volume created date)_xxxxxx.key

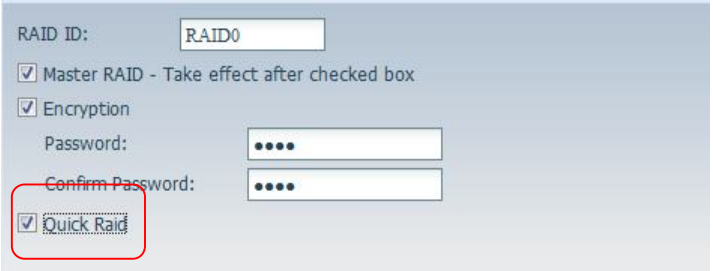
WARNING Please keep USB disk in a safe place and also backup the encrypted key. **There is no way to rescue data back if the key is lost.**

NOTE With RAID volume encryption enabled, the system performance will goes down.

RAID volumes with encryption enabled will be displayed with a key lock symbol next to volume ID name.



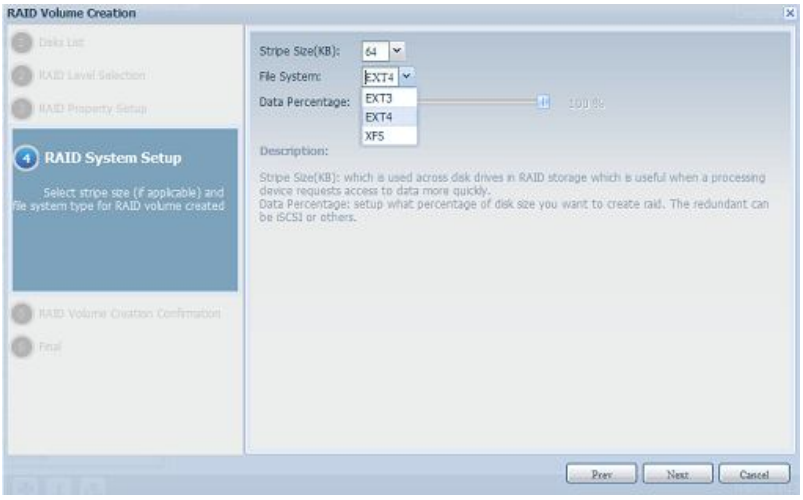
6. Quick RAID — Enabled the quick RAID setting is going to enhance RAID creation time.



NOTE We recommend is "Quick RAID" setting is going to be used, only if hard disk is brand new or it has no existed partitions contained.

7. Specify a stripe size — 64K is the default setting.

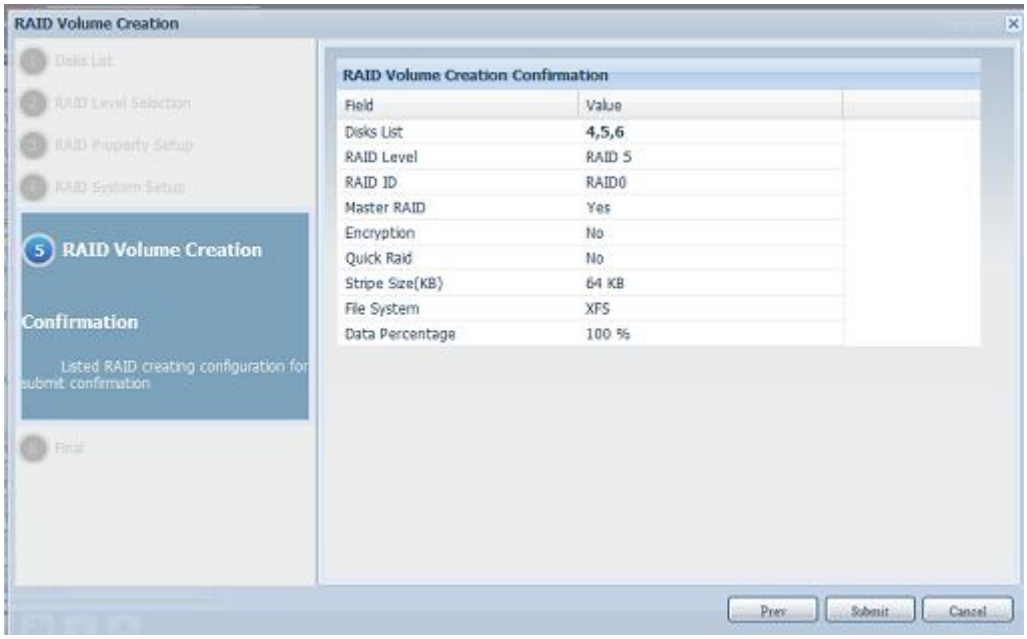
8. Selected the file system you like to have for this RAID volume. The selection is available from ext3, XFS and ext4.

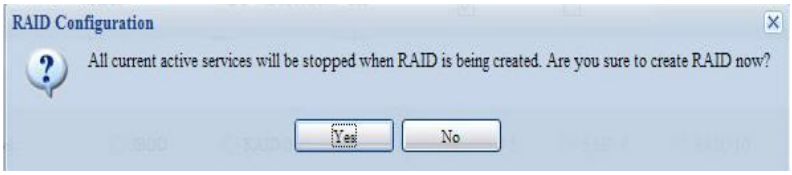


NOTE

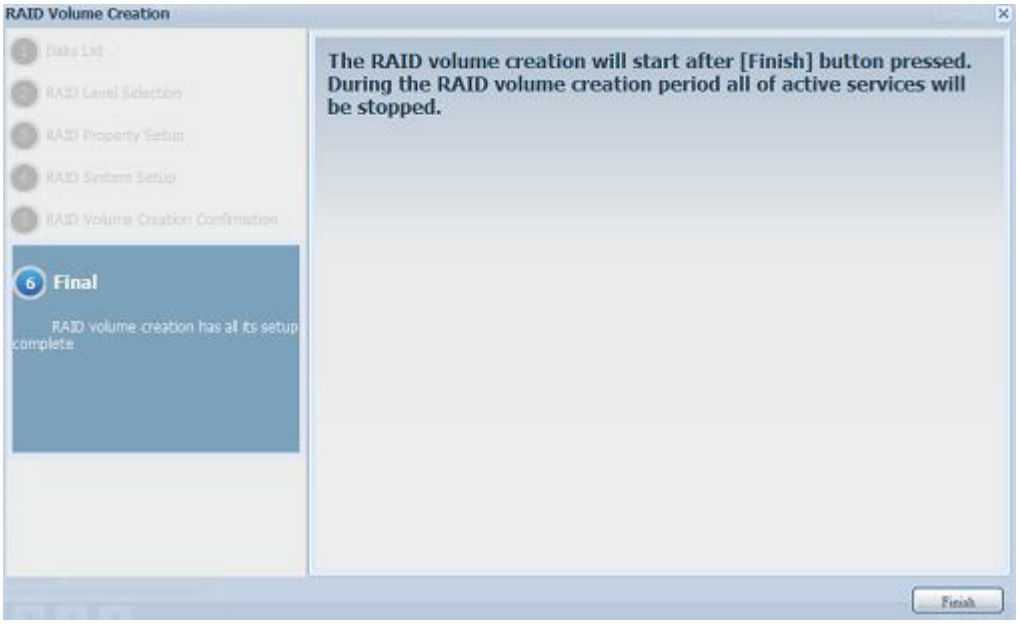
Single volume size supported:
ext3 → 8TB
XFS → 48TB
ext4 → 36TB

9. Press ***Submit*** to build the RAID storage volume.




RAID Configuration
All current active services will be stopped when RAID is being created. Are you sure to create RAID now?
Yes
No

10. Press "Yes" for RAID volume creation preparation. Then click "Finish" to start up with RAID volume building.


RAID Volume Creation
The RAID volume creation will start after [Finish] button pressed. During the RAID volume creation period all of active services will be stopped.
6 Final
RAID volume creation has all its setup complete
Finish

NOTE

Building a RAID volume may take time, depending on the size of hard drives and RAID mode. In general, while the RAID volume building process is up to "RAID Building" then the data volume is capable to be accessed.

WARNING

Creating RAID destroys all data in the current RAID volume. The data is unrecoverable.

RAID Level

You can set the storage volume as **JBOD**, **RAID 0**, **RAID 1**, **RAID 5, RAID 6, RAID 10, RAID 50 or RAID 60 (depend on model)**.

Level / Model	JBOD	RAID 0	RAID 1	RAID 5	RAID 6	RAID 10	RAID 50	RAID 60
N12000 series	•	•	•	•	•	•	•	•
N16000 series	•	•	•	•	•	•	•	•
N8900 series	•	•	•	•	•	•	•	•
N6850	•	•	•	•	•	•	•	
N8850	•	•	•	•	•	•	•	•
N10850	•	•	•	•	•	•	•	•
N7700PRO V2	•	•	•	•	•	•	•	
N8800PRO V2	•	•	•	•	•	•	•	•

RAID configuration is usually required only when you first set up the device. A brief description of each RAID setting follows:

RAID Levels	
Level	**Description**
JBOD	The storage volume is a single HDD with no RAID support. JBOD requires a minimum of 1 disk.
RAID 0	Provides data striping but no redundancy. Improves performance but not data safety. RAID 0 requires a minimum of 2 disks.
RAID 1	Offers disk mirroring. Provides twice the read rate of single disks, but same write rate. RAID 1 requires a minimum of 2 disks.
RAID 5	Data striping and stripe error correction information provided. RAID 5 requires a minimum of 3 disks. RAID 5 can sustain one failed disk.
RAID 6	Two independent parity computations must be used in order to provide protection against double disk failure. Two different algorithms are employed to achieve this purpose. RAID 6 requires a minimum of 4 disks. RAID 6 can sustain two failed disks.
RAID 10	RAID 10 has high reliability and high performance. RAID 10 is implemented as a striped array whose segments are RAID 1 arrays. It has the fault tolerance of RAID 1 and the performance of RAID 0. RAID 10 requires 4 disks. RAID 10 can sustain two failed disks.
RAID 50	RAID 50 combines the straight block-level striping of RAID 0 with the distributed parity of RAID 5. This is a RAID 0 array striped across RAID 5 elements. It requires at least 6 drives.
RAID 60	RAID 60 combines the straight block-level striping of RAID 0 with the distributed double parity of RAID 6. That is, a RAID 0 array striped across RAID 6 elements. It requires at least 8 disks.

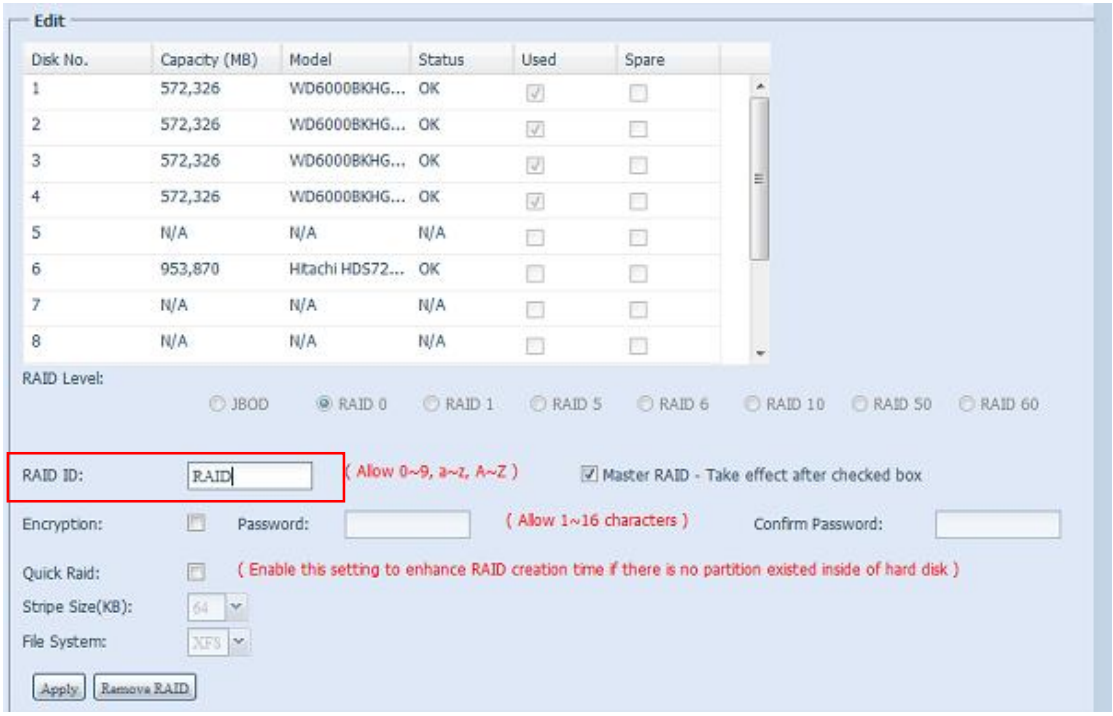
WARNING

If the administrator improperly removes a hard disk that should not be removed when RAID status is degraded, all data will be lost.

Edit RAID

On the **RAID Information** screen, press the ***Edit*** button to go to the **RAID Information** screen.

Using **Edit RAID**, you can select RAID ID and the Spare Disk. .



RAID Configuration
All current active services will be stopped when operation is in progress. Are you sure to update setting now?
Yes
No
RAID Configuration
RAID Infomation update Successfully!
OK

Remove RAID

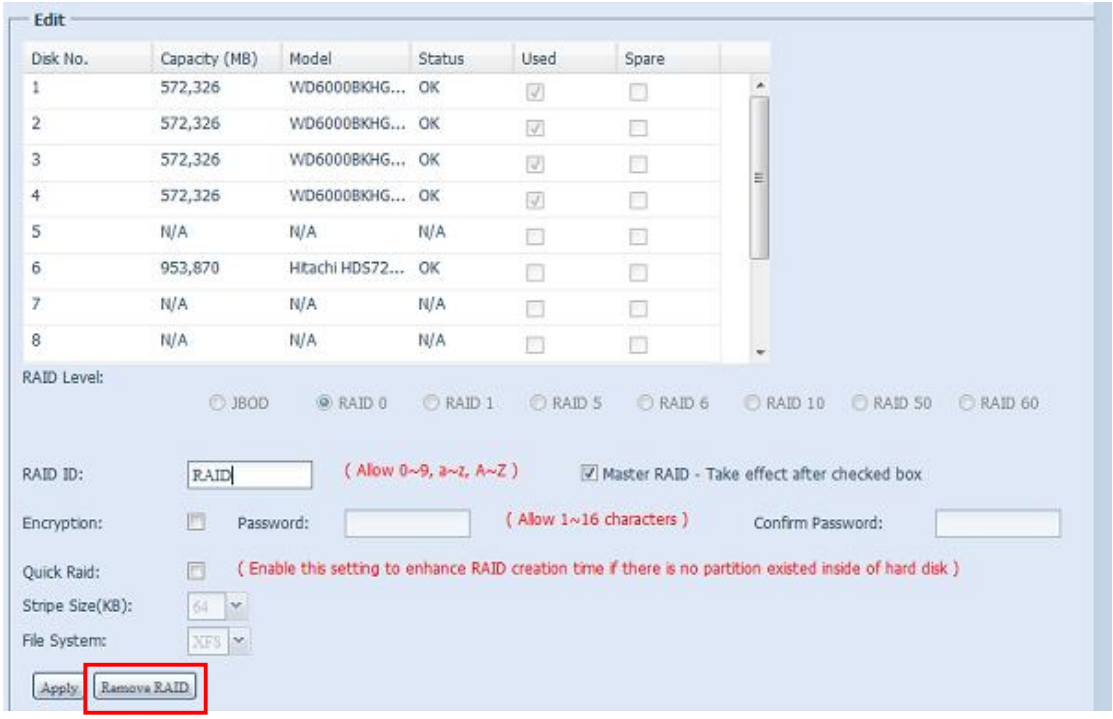
Click to remove the RAID volume. All user data and iSCSI has been created in selected RAID volume will be removed.

To remove a RAID volume, follow the steps below:

1. On the RAID List screen, select the RAID volume by clicking on its radio button, and click ***RAID Information*** to open the **RAID Configuration** screen.

2. On the **RAID Configuration** screen, click ***Remove RAID***.

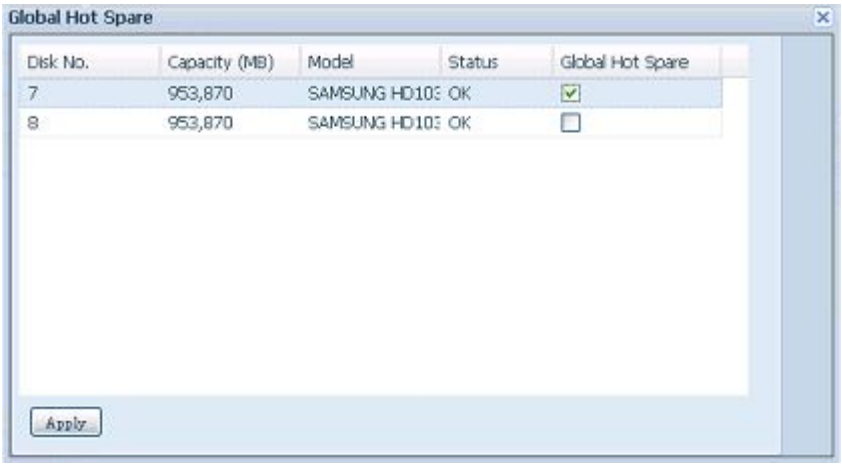
3. The confirmation screen appear, you will have to input "Yes" with exactly wording case to complete "**Remove RAID**" operation



WARNING Remove RAID destroys all data in the current RAID volume. The data is unrecoverable.

Global Hot Spare

With up to 5 RAID volume can be created per system. The global hot spare support can eliminate the redundant of disk usage in each RAID volume. Simply select unset disk from global hot spare disk list then apply to activate.



Expanding a RAID

To expand a RAID 1, RAID 5, or RAID 6 volume, follow the steps below:

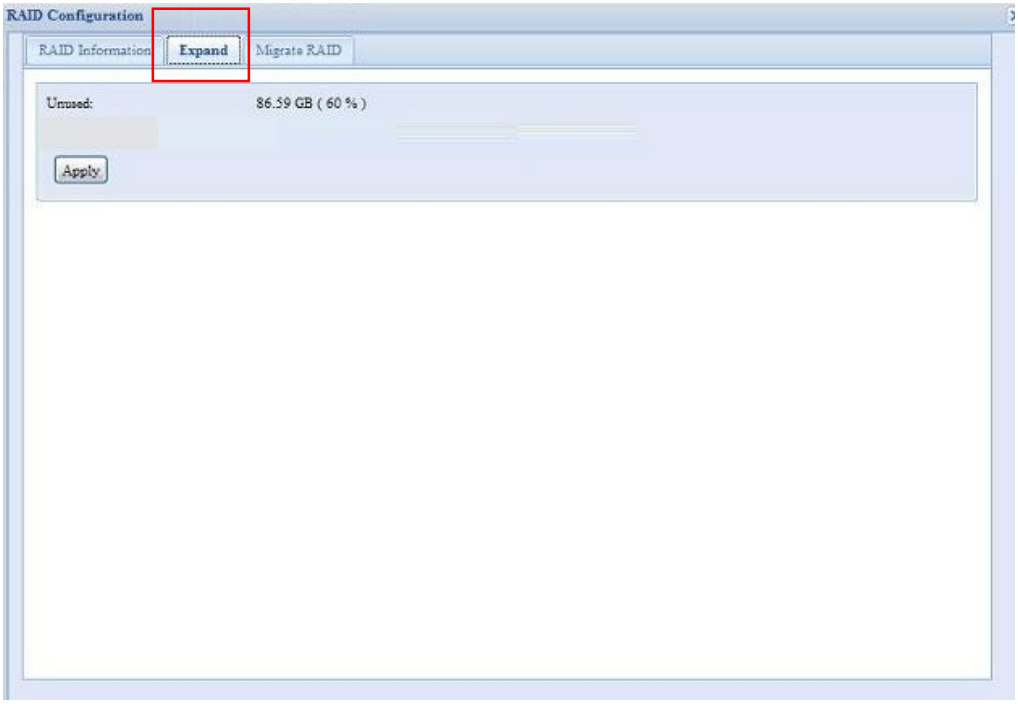
1. Replace one of the hard drives in the RAID volume and allow it to automatically rebuild.

2. Once rebuilt, you can continue to replace any remaining disks in the RAID array.

3. When you are done replacing hard drives, log on to Web Management. Navigate to **Storage**> ***RAID*** to open the **RAID Configuration** screen.

4. On the **RAID Information** screen, and click ***Edit*** to open the **RAID Configuration** screen.

5. On the **RAID Configuration** screen, click ***Expand***.



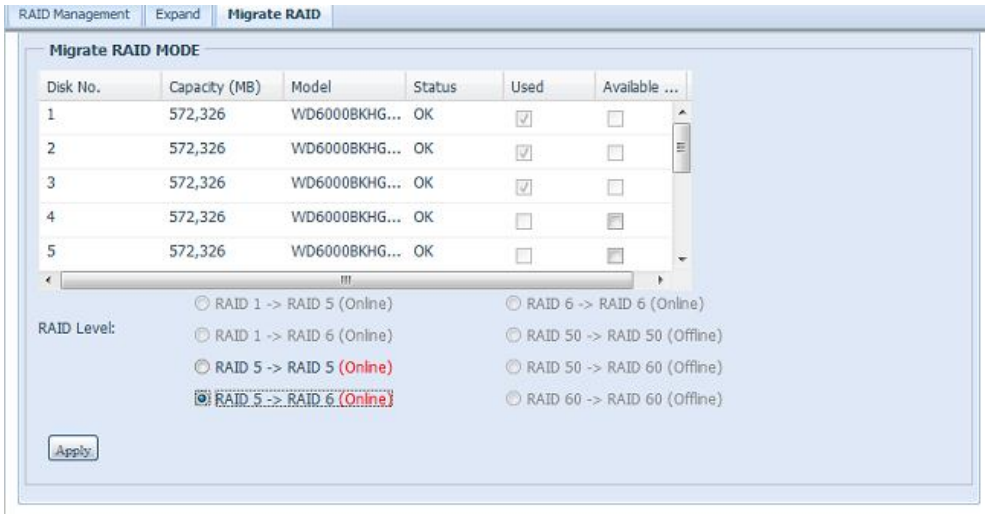
Migrating a RAID

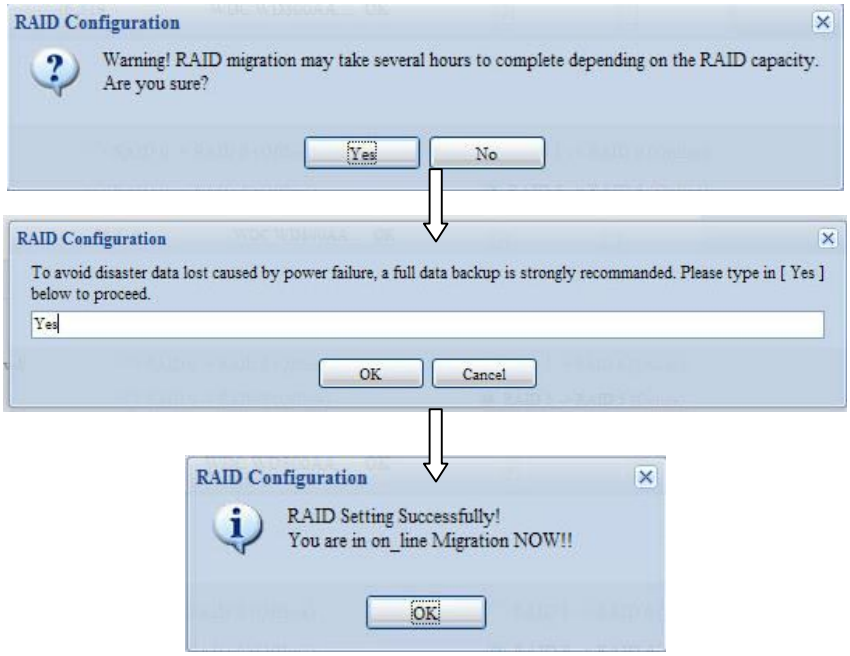
Once a RAID volume has been created, you may want to move it to other physical drives or change the RAID array all together. To migrate a RAID 1, RAID 5, RAID 6, RAID50 or RAID 60 volume, follow the steps below:

1. From the RAID Configuration screen, click **Migrate RAID.**

2. A list of possible RAID migration configurations will be listed. Select the desired migration scheme and click **Apply**.

3. The system will begin migrating the RAID volume.




RAID Configuration
Warning! RAID migration may take several hours to complete depending on the RAID capacity.
Are you sure?
Yes
No
RAID Configuration
To avoid disaster data lost caused by power failure, a full data backup is strongly recommanded. Please type in [Yes] below to proceed.
Yes
OK
Cancel
RAID Configuration
RAID Setting Successfully!
You are in on_line Migration NOW!!
OK

NOTE

- Migrating a RAID volume could take several hours to complete
- The RAID migration feature is available while it is configurable.

With RAID level migration function, the limitation as listed below.

1. During RAID level migration, it is not allowed reboot or shutdown system.
2. The RAID migration from **R1 to R5 or R1 to R6**, the all services will restart and volumes "iSCSI" is read only but "user data" is capable read / write during operation.

NOTE

The migration scheme below is based on Thecus IP Storage products in maximum possible combination. The other model which has less HDD supported can refer web UI while RAID migration operated.

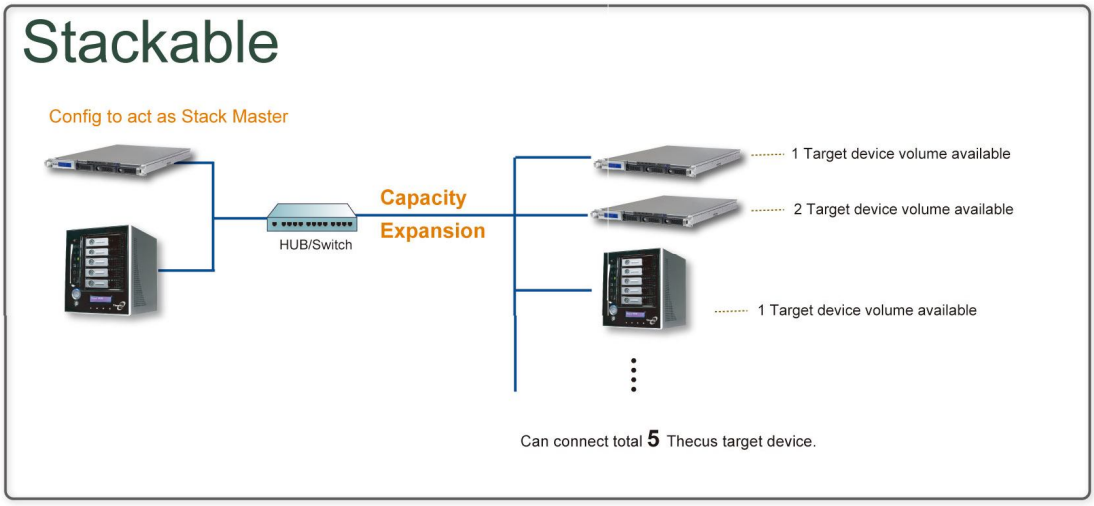
Below is a table listing of possible RAID migration schemes:

To From	RAID 0	RAID 5	RAID 6
RAID 1		[RAID 1] HDDx2 to [RAID 5] HDDx3 [RAID 1] HDDx2 to [RAID 5] HDDx4 [RAID 1] HDDx2 to [RAID 5] HDDx5 [RAID 1] HDDx2 to [RAID 5] HDDx6 [RAID 1] HDDx2 to [RAID 5] HDDx7 [RAID 1] HDDx2 to [RAID 5] HDDx8 ……..HDDx16 [RAID 1] HDDx3 to [RAID 5] HDDx4 [RAID 1] HDDx3 to [RAID 5] HDDx5 [RAID 1] HDDx3 to [RAID 5] HDDx6 [RAID 1] HDDx3 to [RAID 5] HDDx7 [RAID 1] HDDx3 to [RAID 5] HDDx8 ……..HDDx16 [RAID 1] HDDx4 to [RAID 5] HDDx5 [RAID 1] HDDx4 to [RAID 5] HDDx6 [RAID 1] HDDx4 to [RAID 5] HDDx7 [RAID 1] HDDx4 to [RAID 5] HDDx8 ……..HDDx16 [RAID 1] HDDx5 to [RAID 5] HDDx6 [RAID 1] HDDx5 to [RAID 5] HDDx7 [RAID 1] HDDx5 to [RAID 5] HDDx8 ……..HDDx16 [RAID 1] HDDx6 to [RAID 5] HDDx7 [RAID 1] HDDx6 to [RAID 5] HDDx8 ……..HDDx16 [RAID 1] HDDx7 to [RAID 5] HDDx8 ……..HDDx16	[RAID 1] HDDx2 to [RAID 6] HDDx4 [RAID 1] HDDx2 to [RAID 6] HDDx5 [RAID 1] HDDx2 to [RAID 6] HDDx6 [RAID 1] HDDx2 to [RAID 6] HDDx7 [RAID 1] HDDx2 to [RAID 6] HDDx8 ……..HDDx16 [RAID 1] HDDx3 to [RAID 6] HDDx4 [RAID 1] HDDx3 to [RAID 6] HDDx5 [RAID 1] HDDx3 to [RAID 6] HDDx6 [RAID 1] HDDx3 to [RAID 6] HDDx7 [RAID 1] HDDx3 to [RAID 6] HDDx8 ……..HDDx16 [RAID 1] HDDx4 to [RAID 6] HDDx5 [RAID 1] HDDx4 to [RAID 6] HDDx6 [RAID 1] HDDx4 to [RAID 6] HDDx7 [RAID 1] HDDx4 to [RAID 6] HDDx8 ……..HDDx16 [RAID 1] HDDx5 to [RAID 6] HDDx6 [RAID 1] HDDx5 to [RAID 6] HDDx7 [RAID 1] HDDx5 to [RAID 6] HDDx8 ……..HDDx16 [RAID 1] HDDx6 to [RAID 6] HDDx7 [RAID 1] HDDx6 to [RAID 6] HDDx8 ……..HDDx16 [RAID 1] HDDx7 to [RAID 6] HDDx8 ……..HDDx16
RAID 5	X	[RAID 5] HDDx3 to [RAID 5] HDDx4 [RAID 5] HDDx3 to [RAID 5] HDDx5 [RAID 5] HDDx3 to [RAID 5] HDDx6 [RAID 5] HDDx3 to [RAID 5] HDDx7 [RAID 5] HDDx3 to [RAID 5] HDDx8 ……..HDDx16 [RAID 5] HDDx4 to [RAID 5] HDDx5 [RAID 5] HDDx4 to [RAID 5] HDDx6 [RAID 5] HDDx4 to [RAID 5] HDDx7 [RAID 5] HDDx4 to [RAID 5] HDDx8 ……..HDDx16 [RAID 5] HDDx5 to [RAID 5] HDDx6 [RAID 5] HDDx5 to [RAID 5] HDDx7 [RAID 5] HDDx5 to [RAID 5] HDDx8 ……..HDDx16 [RAID 5] HDDx6 to [RAID 5] HDDx7 [RAID 5] HDDx6 to [RAID 5] HDDx8 ……..HDDx16 [RAID 6] HDDx7 to [RAID 5] HDDx8 ……..HDDx16	[RAID 5] HDDx3 to [RAID 6] HDDx4 [RAID 5] HDDx3 to [RAID 6] HDDx5 [RAID 5] HDDx3 to [RAID 6] HDDx6 [RAID 5] HDDx3 to [RAID 6] HDDx7 [RAID 5] HDDx3 to [RAID 6] HDDx8 ……..HDDx16 [RAID 5] HDDx4 to [RAID 6] HDDx5 [RAID 5] HDDx4 to [RAID 6] HDDx6 [RAID 5] HDDx4 to [RAID 6] HDDx7 [RAID 5] HDDx4 to [RAID 6] HDDx8 ……..HDDx16 [RAID 5] HDDx5 to [RAID 6] HDDx6 [RAID 5] HDDx5 to [RAID 6] HDDx7 [RAID 5] HDDx5 to [RAID 6] HDDx8 ……..HDDx16 [RAID 5] HDDx6 to [RAID 6] HDDx7 [RAID 5] HDDx6 to [RAID 6] HDDx8 ……..HDDx16 [RAID 5] HDDx7 to [RAID 6] HDDx8 ……..HDDx16

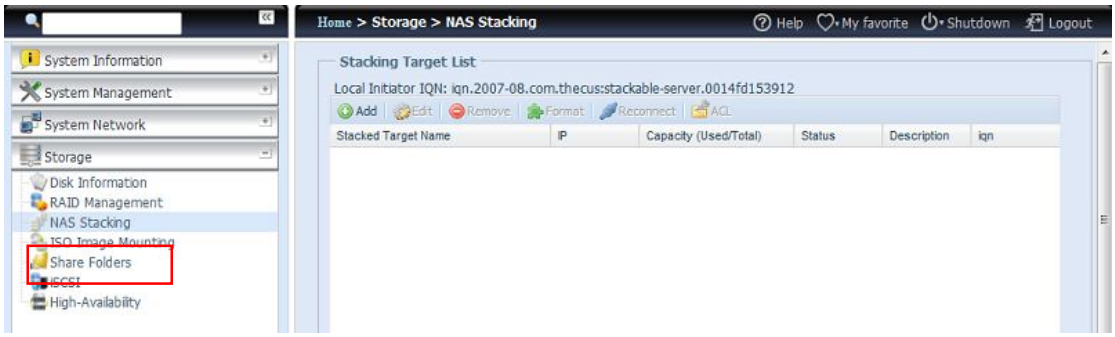
RAID 6	X	X	[RAID 6] HDDx4 to [RAID 6] HDDx5 [RAID 6] HDDx4 to [RAID 6] HDDx6 [RAID 6] HDDx4 to [RAID 6] HDDx7 [RAID 6] HDDx4 to [RAID 6] HDDx8 ……..HDDx16 [RAID 6] HDDx5 to [RAID 6] HDDx6 [RAID 6] HDDx5 to [RAID 6] HDDx7 [RAID 6] HDDx5 to [RAID 6] HDDx8 ……..HDDx16 [RAID 6] HDDx6 to [RAID 6] HDDx7 [RAID 6] HDDx6 to [RAID 6] HDDx8 ……..HDDx16 [RAID 6] HDDx7 to [RAID 6] HDDx8 ……..HDDx16

NAS Stacking

The Thecus IP storage's capacity can be expanded even further using the stackable function. With it, users can expand the capacity of their network storage systems up to 5 other stack target volumes which are located in different systems. These can be stacked through single network access like SMB or AFP acting as a share folder type.



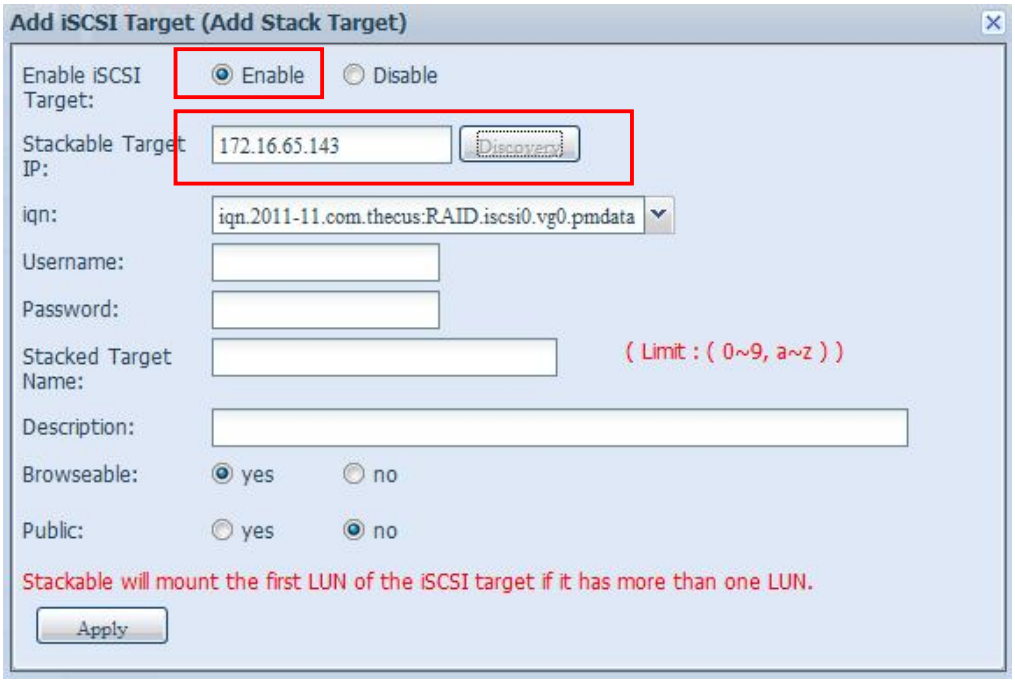
From the main menu, the stackable feature is located under "Storage". Please refer the figure below for reference.



A. *Add a Stack Target Volume*

From the figure above, click ***Add*** to access the stackable target device configuration page. Please refer to the figure below:

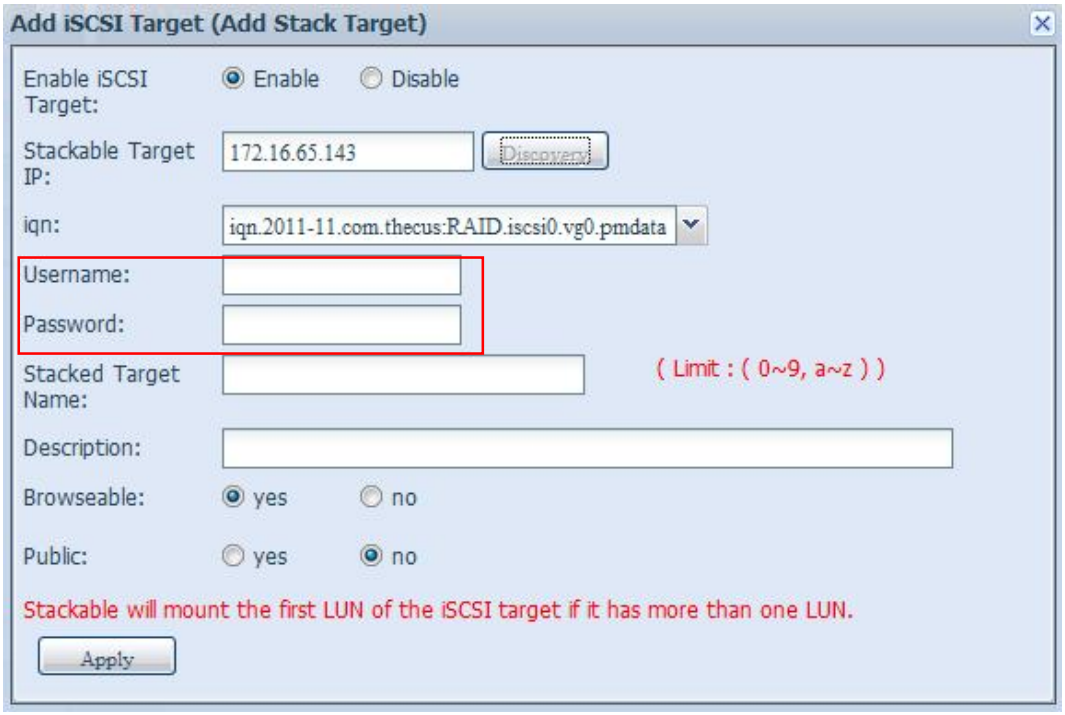
With the added stack target you could "Enable" or "Disable" now or later per usage needed.



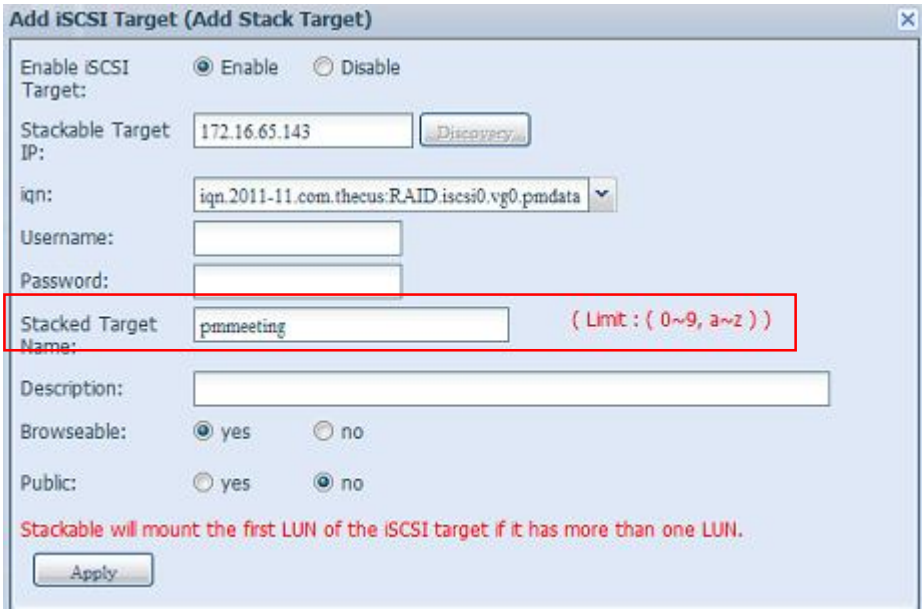
Next, input the target IP address of the stackable device and click the ***Discovery*** button. The system will list available target volumes from the inputted IP address.

Once IP with volume have been set, you may need to input a valid user name and password to validate your access rights. If there is no user name and password needed to access target volume, then leave it blank.

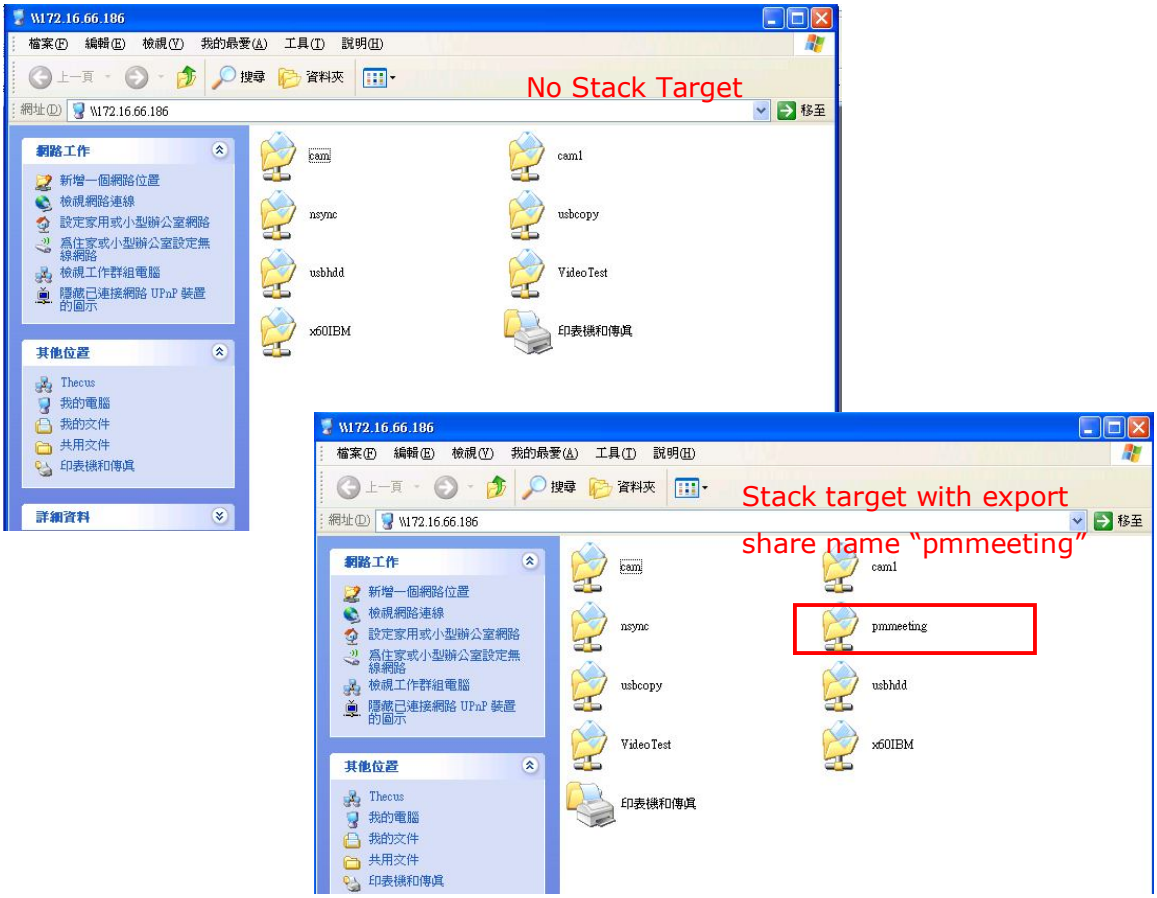
Once IP with volume have been set, you may need to input a valid user name and password to validate your access rights. If there is no user name and password needed to access target volume, then leave it blank.



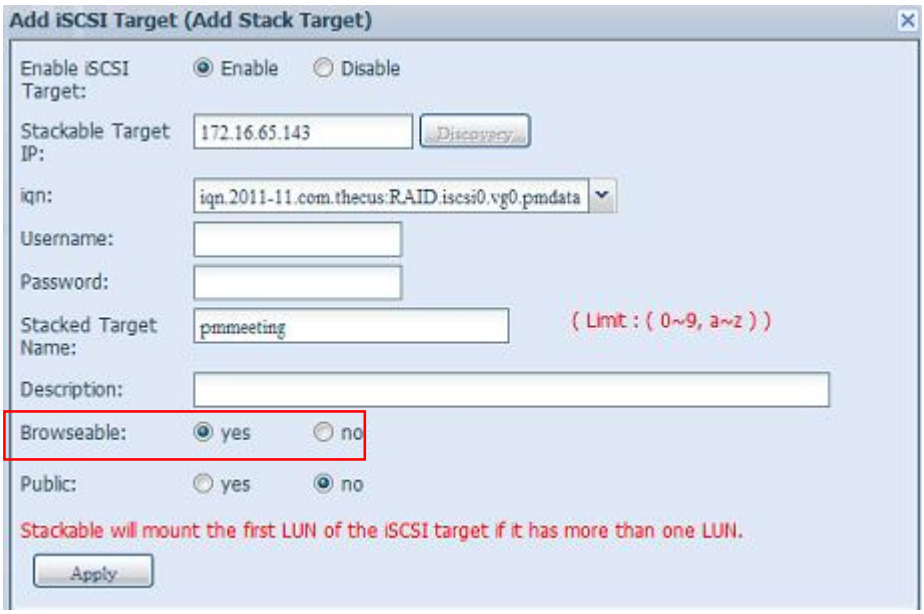
The **Stackd Target name** will become the network share name and displayed through network access such as SMB. You may refer the figures below to see the result. Please note the naming limitation.



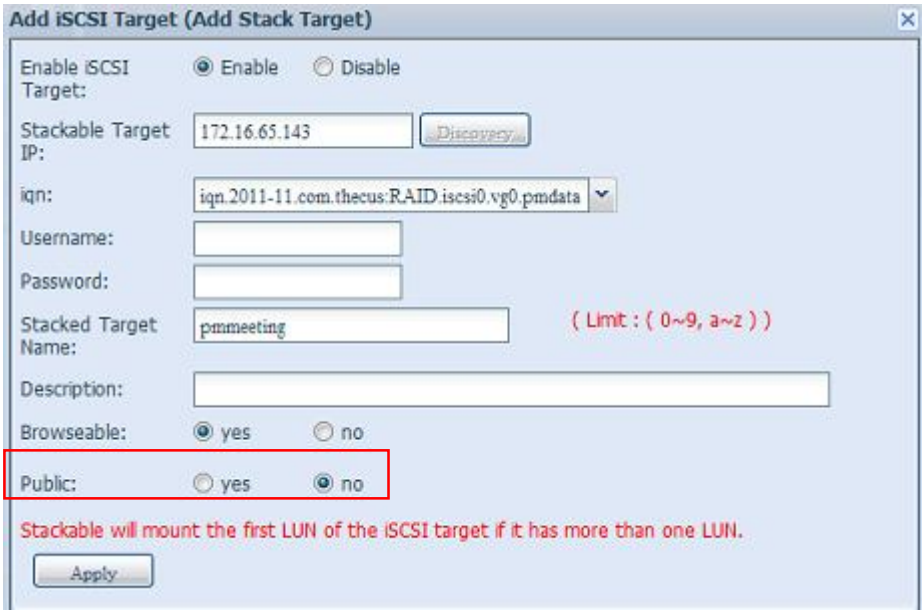
From the figure above, the **Stacked Target name** is "pmdata1". The figures below show the result before and after via Microsoft Network Access with settings have been completed.



The **Browseable** setting will be same method of setting for system share folder. It designates whether or not this folder will be visible through web disk. You may refer the figures below for reference when **Yes** and **No** are selected.



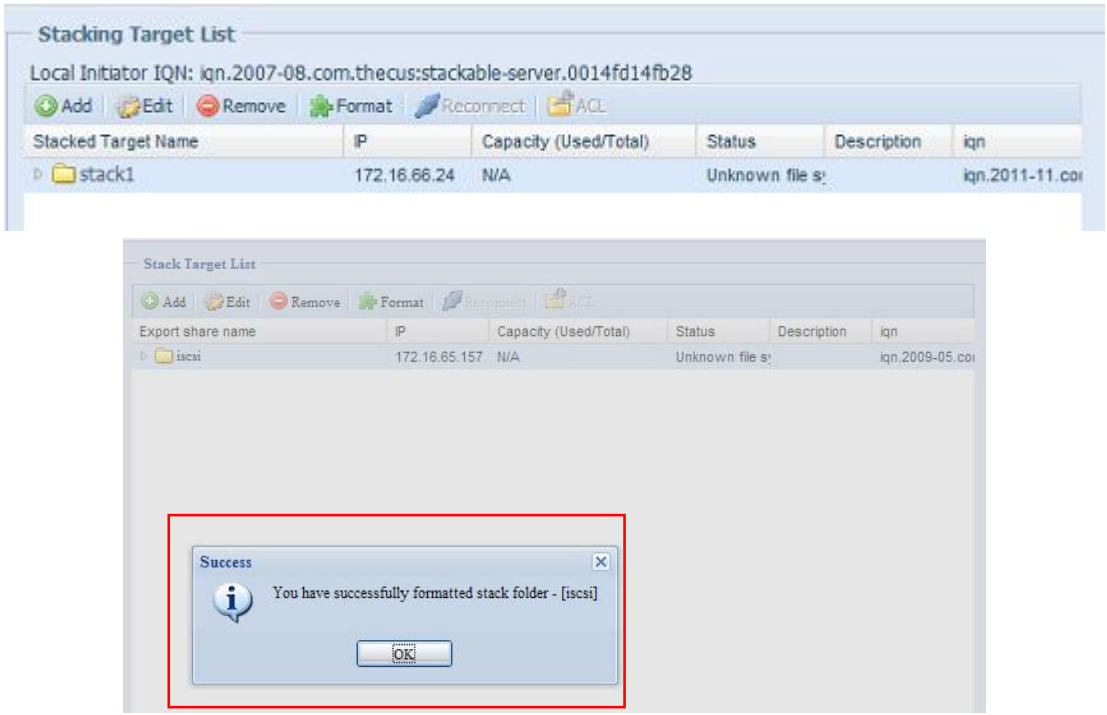
The **Public** setting will be set same as what the setting for the system share folder associated with the ACL permission setup. If **Public** is set to **Yes**, all users will be able to access it, and **ACL** button will be grayed out. If **Public** is set to **No**, the ACL button will be available on the **Stack Target List** window.



Click ***Apply*** to save your changes.

B. Activate a Stack Target

After your settings have been applied, the system will bring you back to **Stack Target List** window as shown below. There is one stack target device has been attached into this stack master.

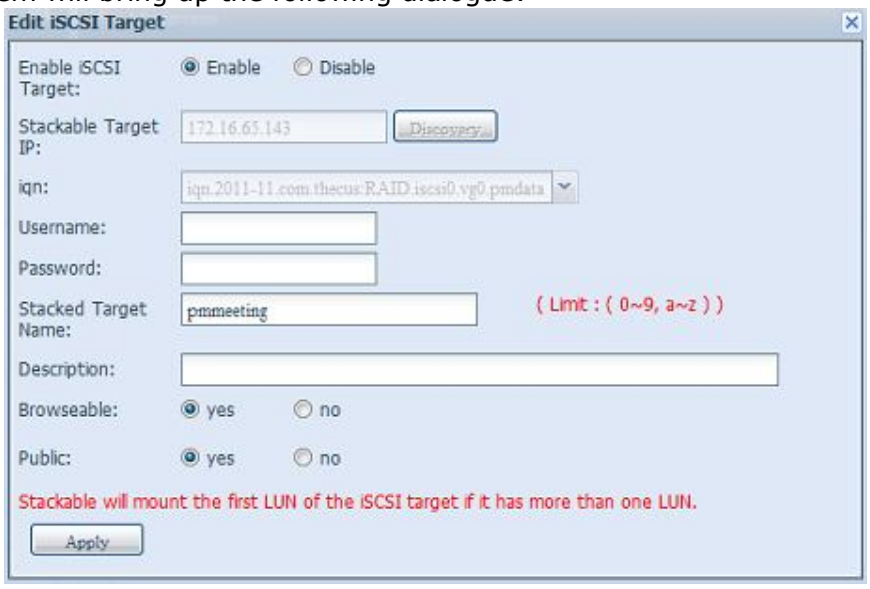


With this newly attached stack target device, you will see the information displayed and also several options you can choose.

In general, if attached stack target device has been used by another Thecus NAS as stack target volume, then the **Format** item will be display and system will recognize it straight away and display its capacity. Otherwise, the **Format** item will be available and the **Capacity** and **Status** items will show as "N/A" and "Unknown file system" respectively.
Next, click ***Format*** to proceed with formatting.
After the format is complete, the stack target volume will be created successfully. You will see the volume's capacity and status in the **Stack Target List** screen.

C. *Edit a Stack Target*

To make any changes to stack targets, click ***Edit*** for the corresponding stack target, and system will bring up the following dialogue:

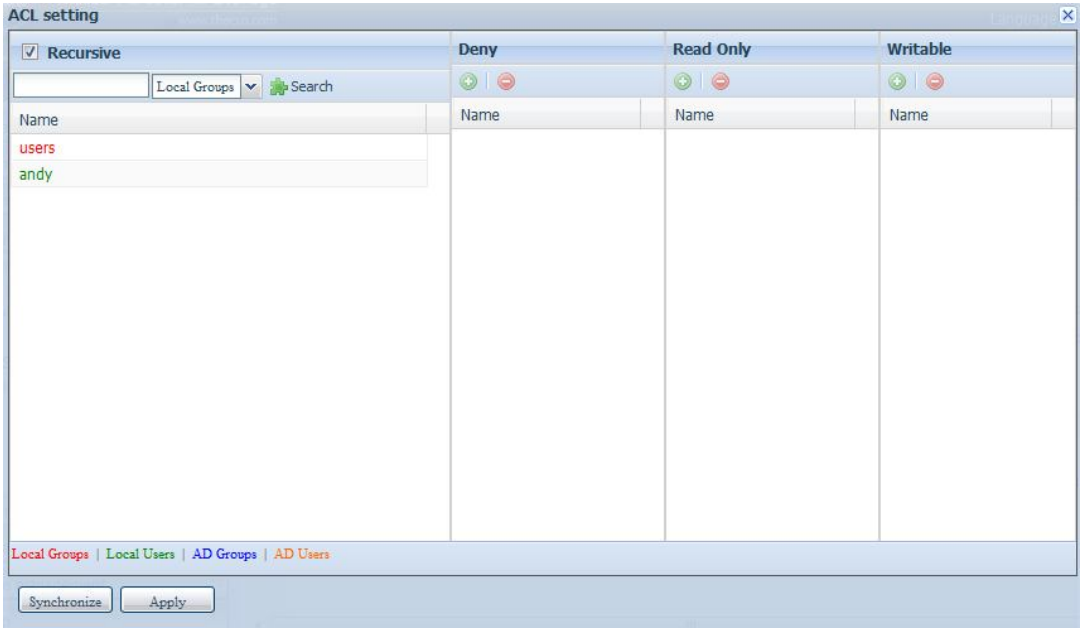


After your changes have been made, click ***Apply*** to confirm any modifications. Once changes are applied, the associated information will be updated on the **Stack Target List** window.

D. *Stack Target ACL*

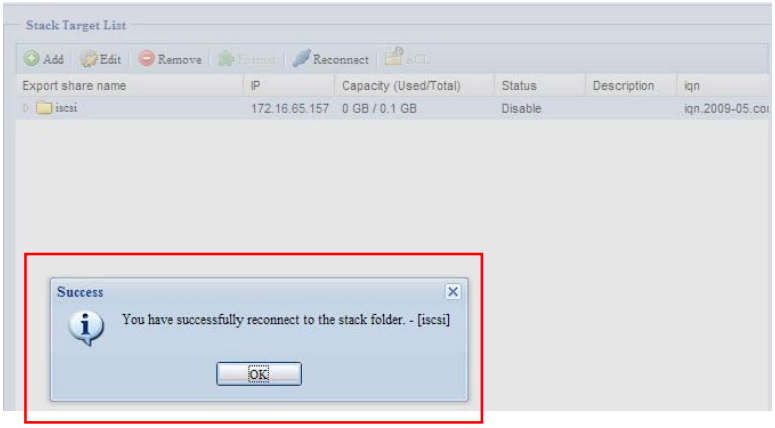
If the stack target **Public** setting set to ***Yes***, then the **ACL** button will be grayed out. However, if **Public** setting is set to ***No***, then the **ACL** button will be available for you to setup user access permissions for the stack target.

ACL settings will be exactly the same as system folder that you may have setup previously.



E. *Reconnect a Stack Target*

The enabled stack target devices may be disconnected by situations such as power outages or network disconnects. When this happens, the **Reconnect** button will available. To attempt to reconnect the stack target, click ***Reconnect***.

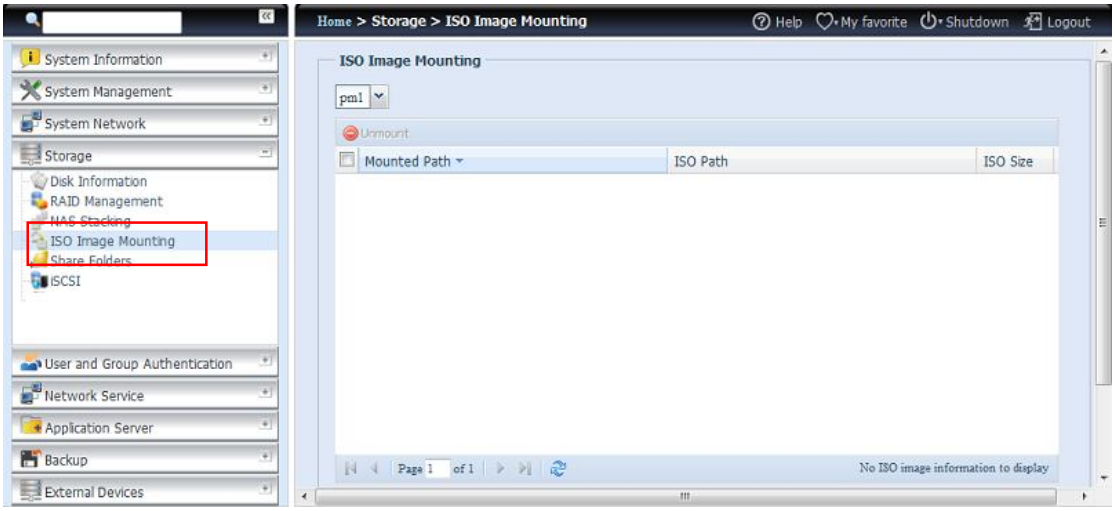


ISO Mount

The ISO Mount feature is very useful tool from Thecus products. With it, users can mount an ISO file and having export name to display all details from mounted ISO file.

From the main menu, the ISO Mount feature is located under "Storage". Please refer the figure below for reference.

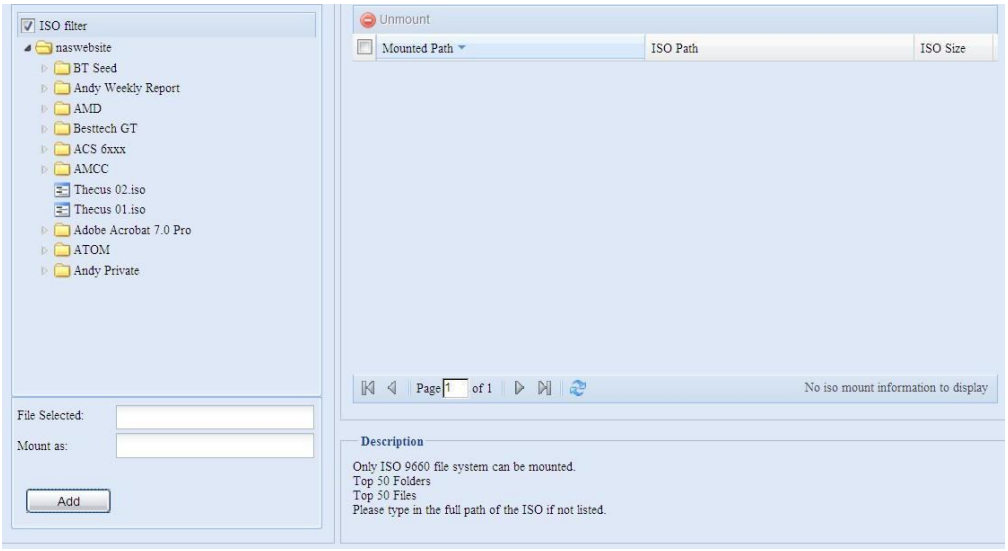
Select on the ISO mount function and you will have the screen shot appear as following.

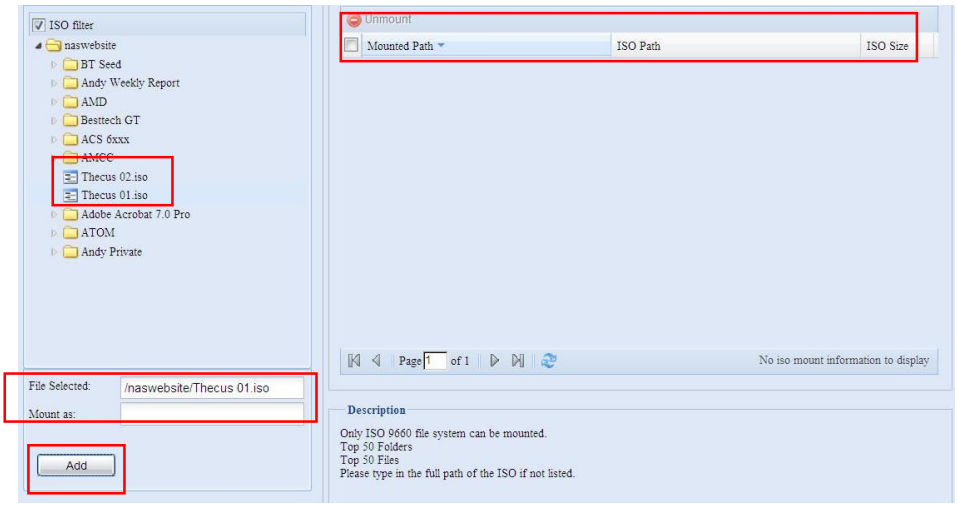


A. *Add a ISO file*

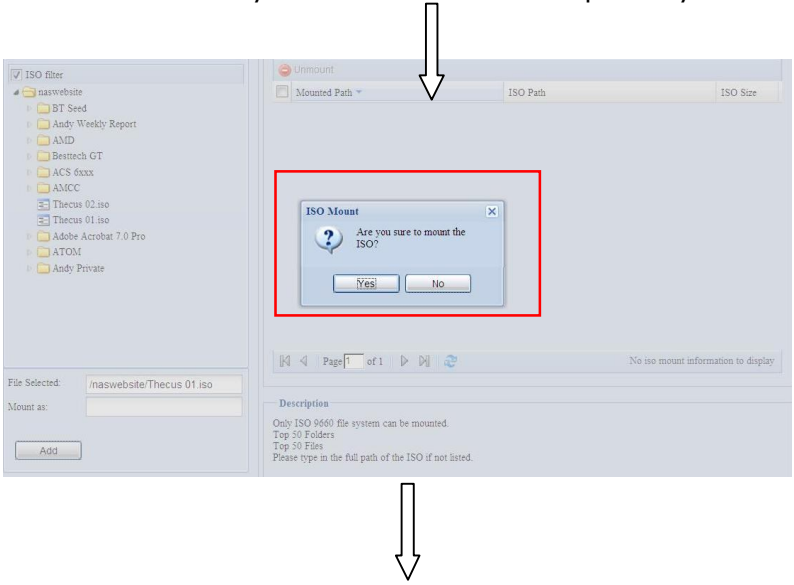
From the figure above, select ISO file from drop down share list.

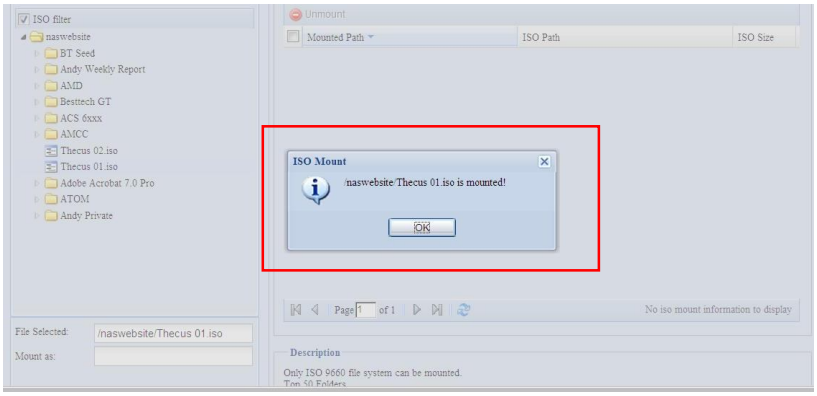
After selection, system will bring up Mount table for further setting screen.



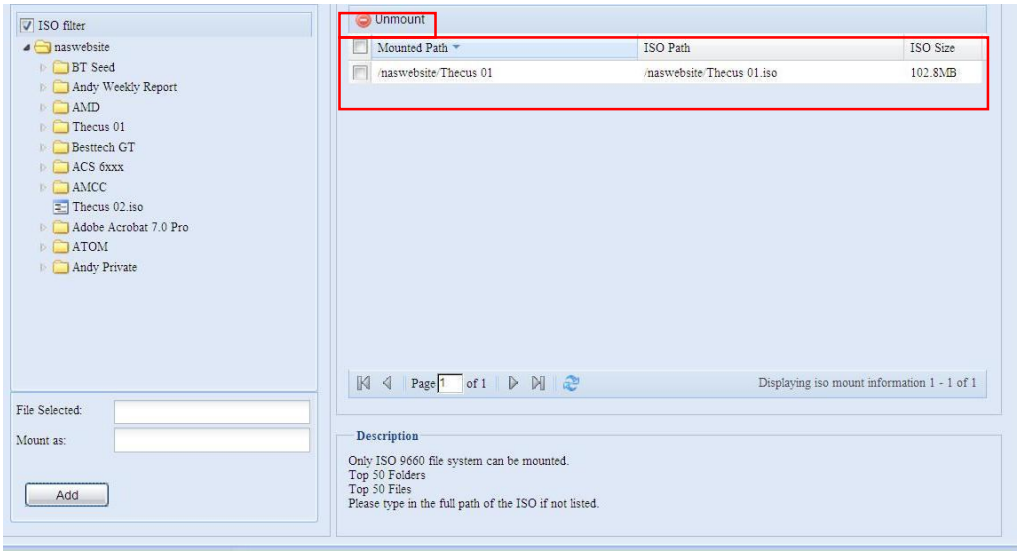


To mount new ISO file, select from listed ISO file and input desired mounting name into "Mount as:" field. Click "ADD" with confirmation to complete mounting ISO file. Or without "Mount as" ISO file export name input, system will automatic to give the export name by ISO file name.
If left "Mount as:" blink then system will create mount point by ISO file name.





After you have completed to add ISO then the page will displayed all mounted ISO files,

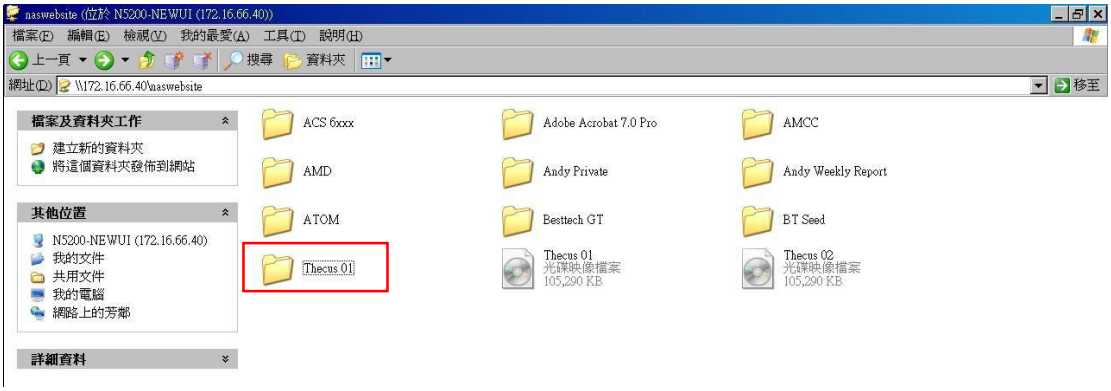


You could click "Unmount" to eliminate mounted ISO file.

B. *Using ISO*

The mounted ISO file will be located same share folder with name giving. Please refer the screen shot below.

ISO file "image" has mounted as folder "Image" you could see. The ISO file "Thecus 01" without assign mounting name, system automatically has folder "Thecus 01" created.

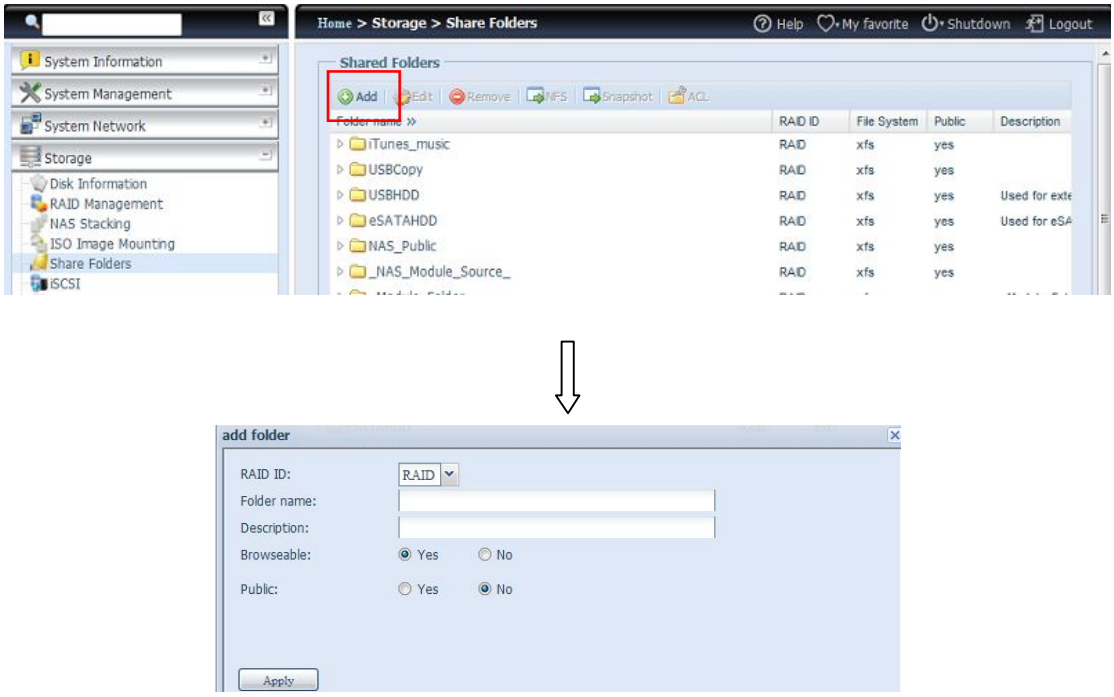


Share Folder

From the **Storage** menu, choose **Share *Folder***, and the **Folder** screen appears. This screen allows you to create and configure folders on the Thecus IP storage volume.

Adding Folders

On the **Folder** screen, press the ***Add*** button and the **Add Folder** screen appears. This screen allows you to add a folder. After entering the information, press ***Apply*** to create new folder.



Add Folder	
Item	**Description**
RAID ID	RAID volume where the new folder will reside.
Folder Name	Enter the name of the folder.
Description	Provide a description the folder.
Browseable	Enable or disable users from browsing the folder contents. If **Yes** is selected, then the share folder will be browseable.
Public	Admit or deny public access to this folder. If **Yes** is selected, then users do not need to have access permission to write to this folder. When accessing a public folder via FTP, the behavior is similar to anonymous FTP. Anonymous users can upload/download a file to the folder, but they cannot delete a file from the folder.

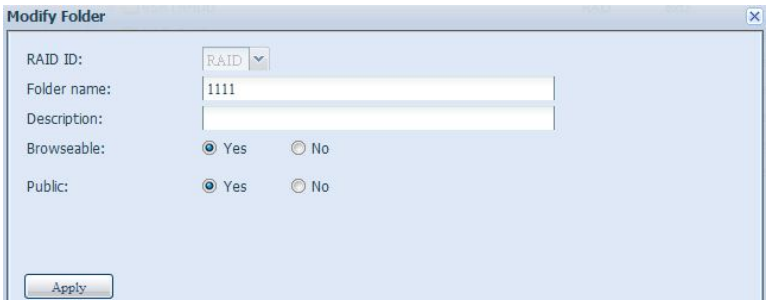
Apply	Press ***Apply*** to create the folder.

NOTE

Folder names are limited to 60 characters. Systems running Windows 98 or earlier may not support file names longer than 15 characters.

Modify Folders

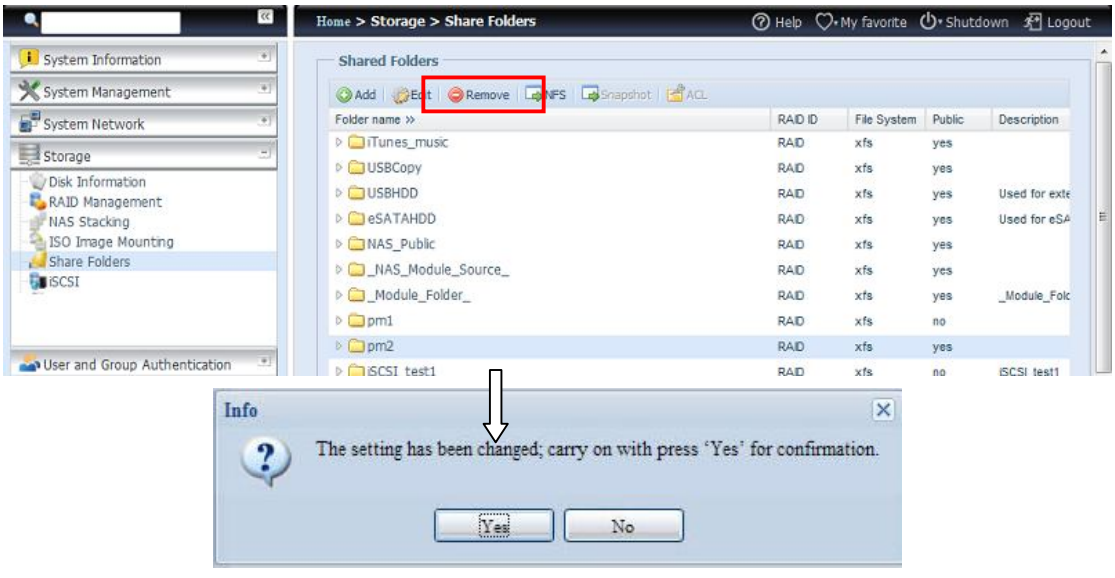
On the **Folder** screen, press the ***Edit*** button and the **Modify Folder** screen appears. This screen allows you to change folder information. After entering the information, press **Apply** to save your changes.



Modify Folder	
Item	**Description**
RAID ID	RAID volume where the folder will reside.
Folder Name	Enter the name of the folder.
Description	Provide a description the folder.
Browseable	Enable or disable users from browsing the folder contents. This setting will only apply while access via SMB/CIFS and web disk.
Public	Admit or deny public access to this folder.

Remove Folders

To remove a folder, press the ***Remove*** button from the specified folder row. The system will confirm folder deletion. Press ***Yes*** to delete the folder permanently or ***No*** to go back to the folder list.

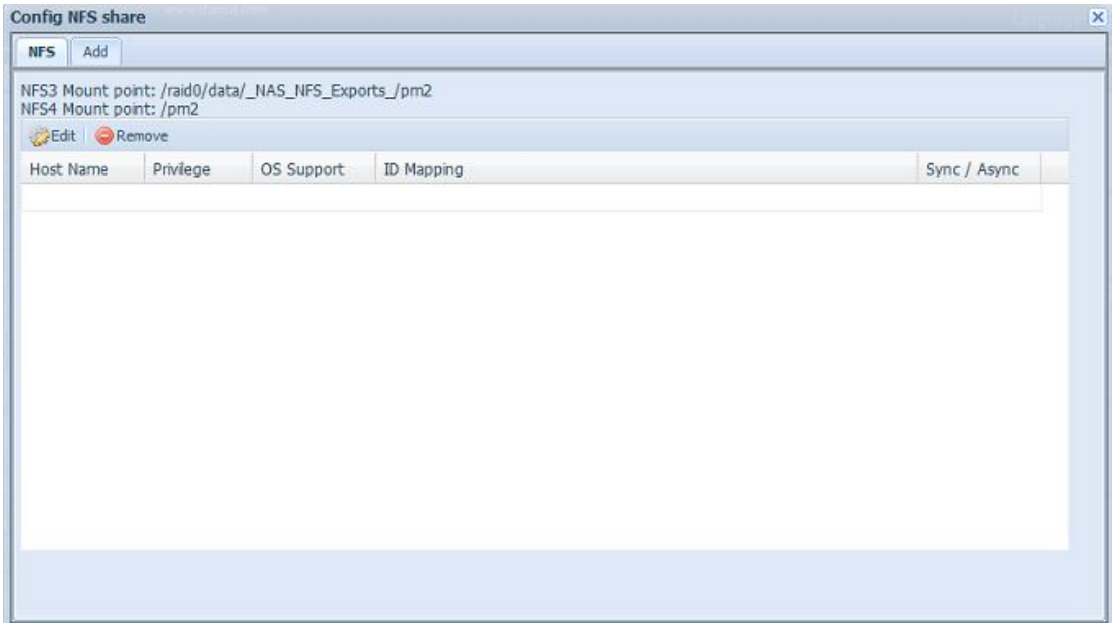


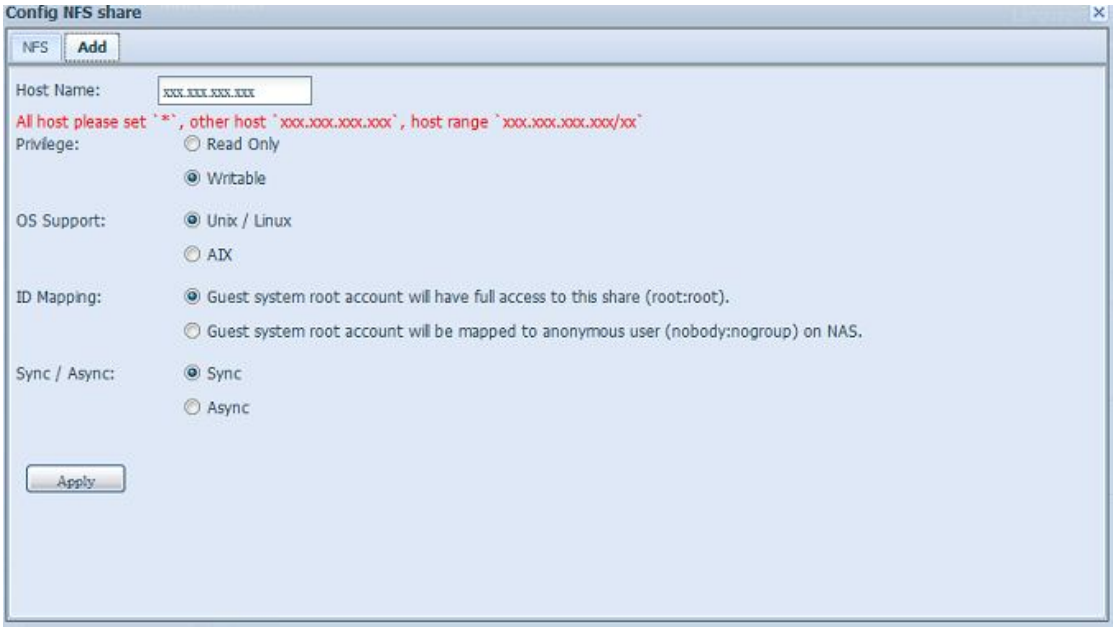
WARNING

All the data stored in the folder will be deleted once the folder is deleted. The data will not be recoverable.

NFS Share

To allow NFS access to the share folder, enable the **NFS Service**, and then set up hosts with access rights by clicking ***Add***.



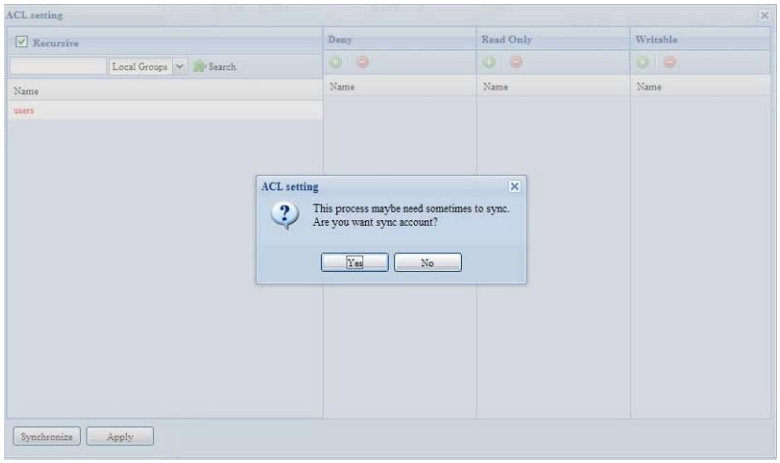


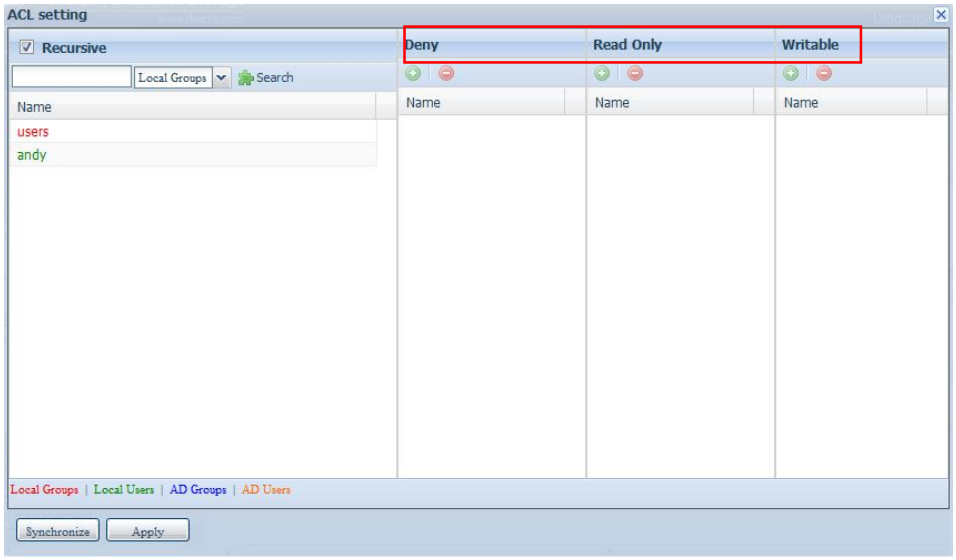
NFS Share	
Item	**Description**
Hostname	Enter the name or IP address of the host
Privilege	Host has either read only or writeable access to the folder.
OS Support	There are two selections available: • Unix / Linux System • AIX (Allow source port > 1024) Choose the one which best fits your needs.
ID Mapping	There are three selections available:

	• Guest system root account will have full access to this share (root:root). • Guest system root account will be mapped to anonymous user (nobody:nogroup) on NAS. • All user on guest system will be mapped to anonymous user (nobody:nogroup) on NAS. Choose the one which best fits your needs.
Sync / Async	Choose to determine the data "Sync" at once or "Async" in arranged batch.
Apply	Click to save your changes.

Folder and sub-folders Access Control List (ACL)

On the Folder screen, press the ***ACL*** button, and the **ACL setting** screen appears. This screen allows you to configure access to the specific folder and sub-folders for users and groups. Select a user or a group from the left hand column and then choose ***Deny***, ***Read Only***, or ***Writable*** to configure their access level. Press the ***Apply*** button to confirm your settings.





ACL setting	
Item	**Description**
Deny	Denies access to users or groups who are displayed in this column.
Read Only	Provides Read Only access to users or groups who are displayed in this column.

Writable	Provides Write access to users or groups who are displayed in this column.
Recursive	Enable to inherit the access right for all its sub-folders.

To configure folder access, follow the steps below:

1. On the **ACL** screen, all network groups and users are listed in the left hand column. Select a group or user from this list.

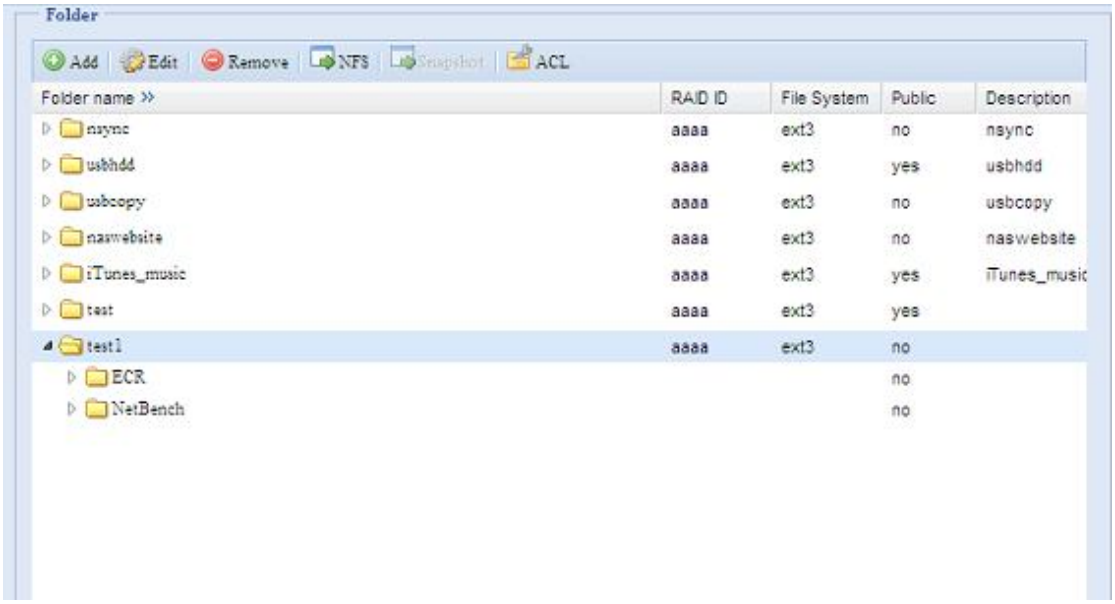
2. With the group or user selected, press one of the buttons from the three access level columns at the top. The group or user then appears in that column and has that level of access to the folder.

3. Continue selecting groups and users and assigning them access levels using the column buttons.
4. To remove a group or user from an access level column, press the ***Remove*** button in that column.

5. When you are finished, press ***Apply*** to confirm your ACL settings.

NOTE If one user has belonged to more than one group but different privilege than the priority Deny > Read Only > Writable

To setup sub-folders ACL, click on " ▷ " symbol to extract sub folders list as screen shot shows below. You may carry on with same steps as share level ACL setting.



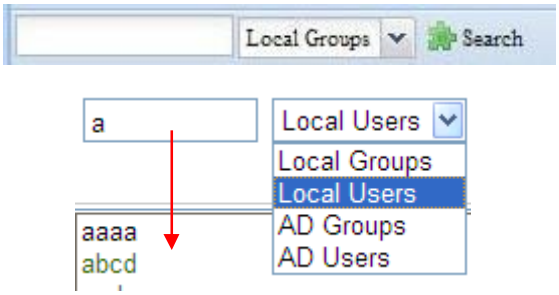
NOTE The ACL can be set for share and sub-folders level, not for files.

The ACL screen also allows you to search for a particular user. To do this, follow the steps below:

1. In the blank, enter the name of the user you would like to find.

2. From the drop down select the group you would like to search for the user in.

3. Click ***Search***.

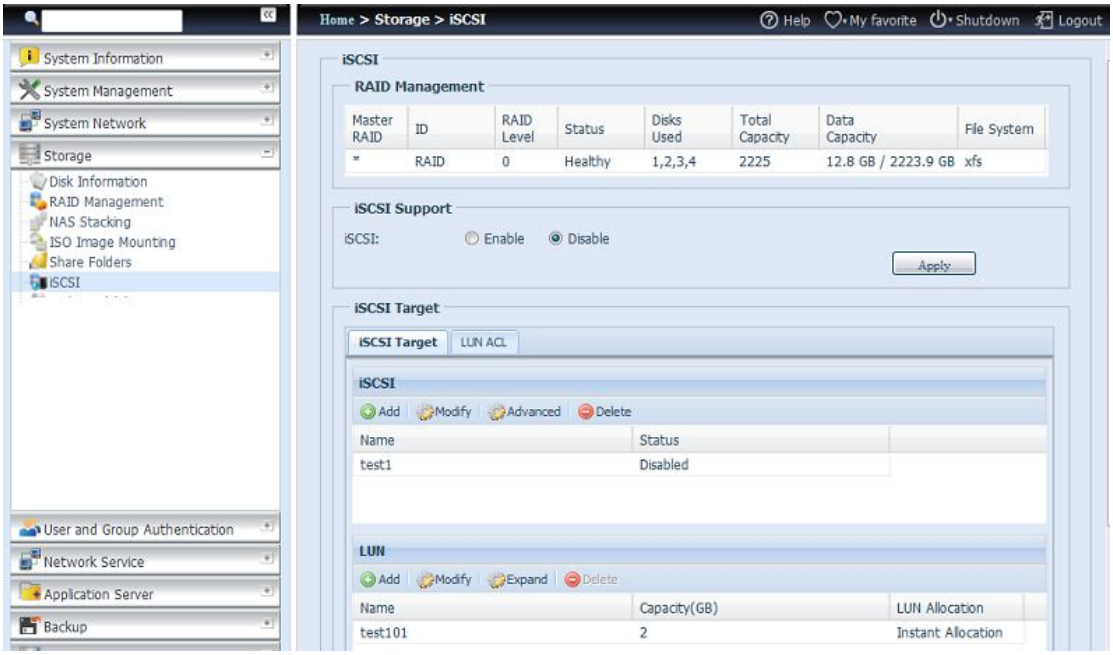


NOTE The system will list up to 1,000 users from the chosen category. To narrow your search, enter a search term in the blank provided.

iSCSI

You may specify the space allocated for iSCSI. The iSCSI target is allowed per system as table blow:.

Model	N8900V	N8900PRO N12000V N16000V N7700PRO V2 N8800PRO V2	N8900 N12000 N16000 N12000PRO N16000PRO
Allow iSCSI volume	15	25	50

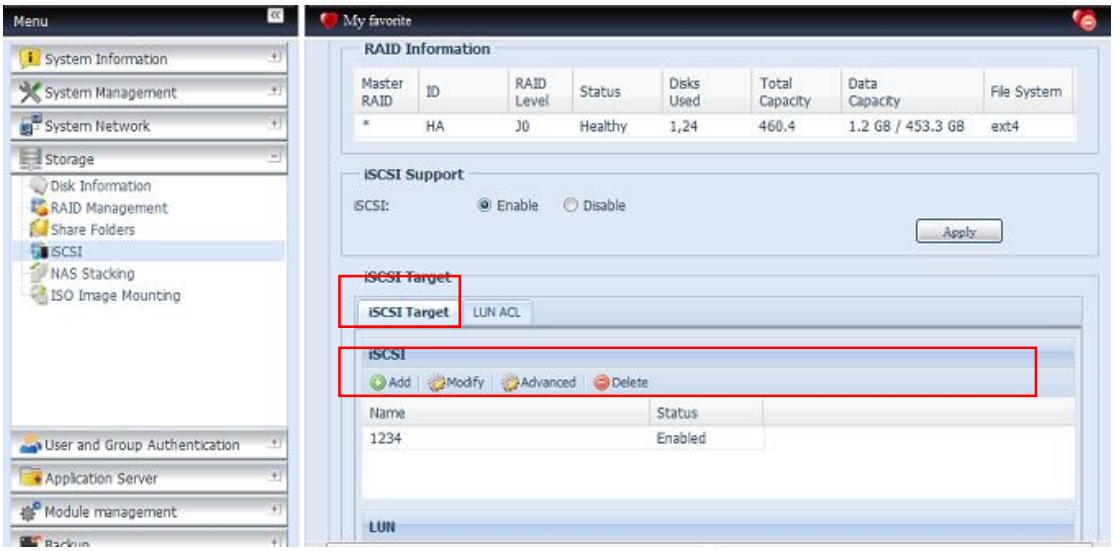


iSCSI Target

To add iSCSI target volume, click **iSCSI** with associated RAID volume from its drop down list to select desired RAID volume.

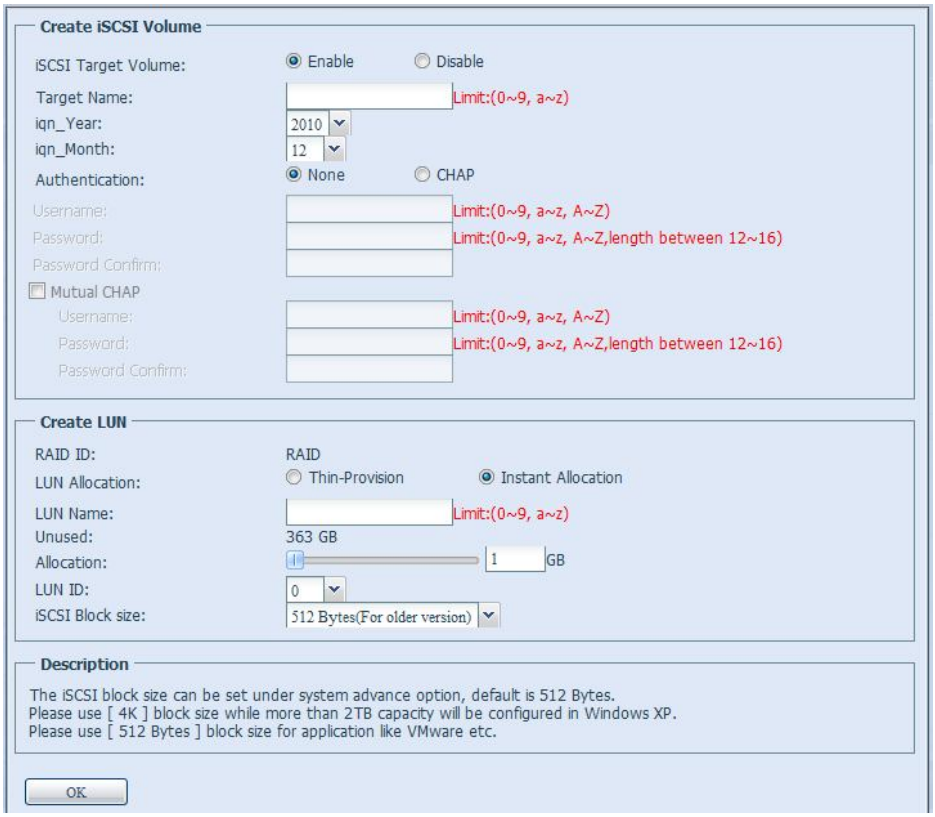
iSCSI Target	
Item	**Description**
Add	Click to allocate space to iSCSI target from associated RAID volume.
Modify	Click this to modify the iSCSI Target.
Advanced	There are 3 options (iSCSI CRC/Checksum, Max Connections, Error Recovery Level) is currently allow Admin to Enable/Disable to operate Thecus IP storage associated with iSCSI setting.
Delete	Click this to delete the iSCSI Target.

Allocating Space for iSCSI Volume



To allocate space for an iSCSI target on the current RAID volume, follow the steps below:

1. Under the **iSCSI Target List**, select ***iSCSI Target then click Add***.
   The **Create iSCSI Volume** screen appears.



Create iSCSI Volume	
Item	**Description**
iSCSI Target Volume	Enable or Disable the iSCSI Target Volume.
Target Name	Name of the iSCSI Target. This name will be used by the **Stackable NAS** function to identify this export share.
iqn_Year	Select the current year from the dropdown.
Iqn_Month	Select the current month from the dropdown.
Authentication	You may choose CHAP authentication or choose None.
Username	Enter a username.
Password	Enter a password.
Password Confirm	Reenter the chosen password
Mutual CHAP	With this level of security, the target and the initiator authenticate each other.
Username	Enter a username.
Password	Enter a password.
Password Confirm	Reenter the chosen password
RAID ID	ID of current RAID volume.
LUN Allocation	Two modes can be choose from: Thin-provision：iSCSI thin-provisioning is sharing the available physical capacity to multiple iSCSI target volumes creation. And allowed virtual capacity be assigned in prior then added physical space while it has run out. Instant Allocation：Allocate available physical capacity to iSCSI target volumes.
LUN Name	Name of the LUN.
Unused	Unused space on current RAID volume.
Allocation	Percentage and amount of space allocated to iSCSI volume.
LUN ID	Specific Logic unit ID number.

iSCSI Block size	The iSCSI block size can be set under system advance option, default is 512 Bytes. [4K] block size while more than 2TB capacity will be configured in Windows XP. [512 Bytes] block size for application like VMware etc.

NOTE Be sure the iSCSI target volume has been enabled or it will not list out while using Initiator to get associated iSCSI target volumes.

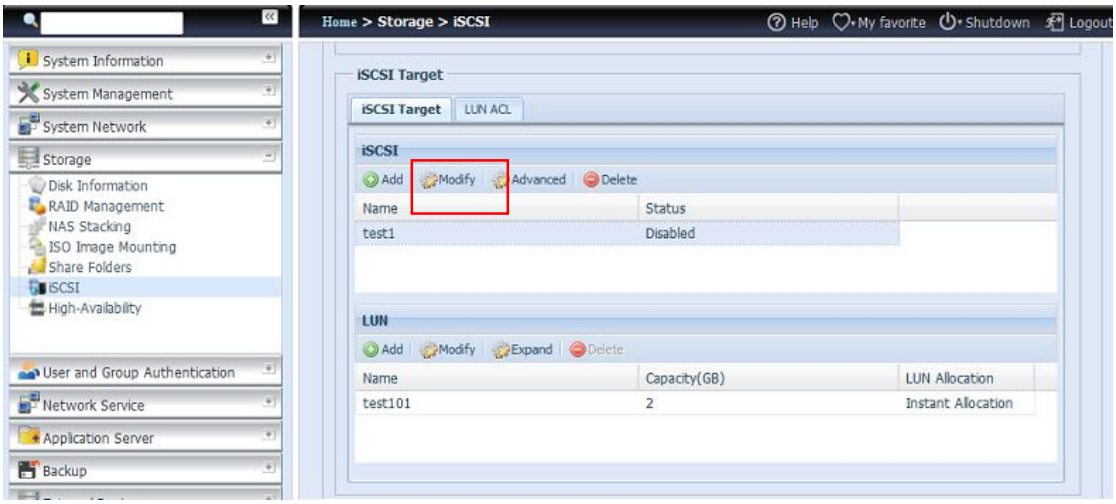
NOTE The iSCSI target volume creation will associate at least one LUN together. It can be assigned either "Thin-Provisioning" or "Instant Allocation".

2. Enable the **iSCSI Target Volume** by selecting ***Enable***.
3. Enter a **Target Name**. This will be used by the **Stackable NAS** function to identify this export share.
4. Choose the current year from the **Year** dropdown.
5. Choose the current month from the **Month** dropdown.
6. Choose to enable ***CHAP*** authentication or choose ***None***.
7. If you've enabled CHAP authentication, enter a **username** and a **password**. Confirm your chosen password be reentering it in the **Password Confirm** box.
8. Choose **Thin-Provision** or **Instant Allocation**
9. Enter a **LUN Name**.
10. Designate the percentage to be allocated from the **Allocation** drag bar.
11. When iSCSI target volume has been created, the LUN ID is configurable from 0 to 254 with a default of the next available number in ascending numerical order. The LUN ID is unique and can not be duplicated.
12. Choose **[4K] block size** to have iSCSI target volume over 2TB barrier or **[512 Bytes] block size** in some application needed.
13. Click ***OK*** to create the iSCSI volume.

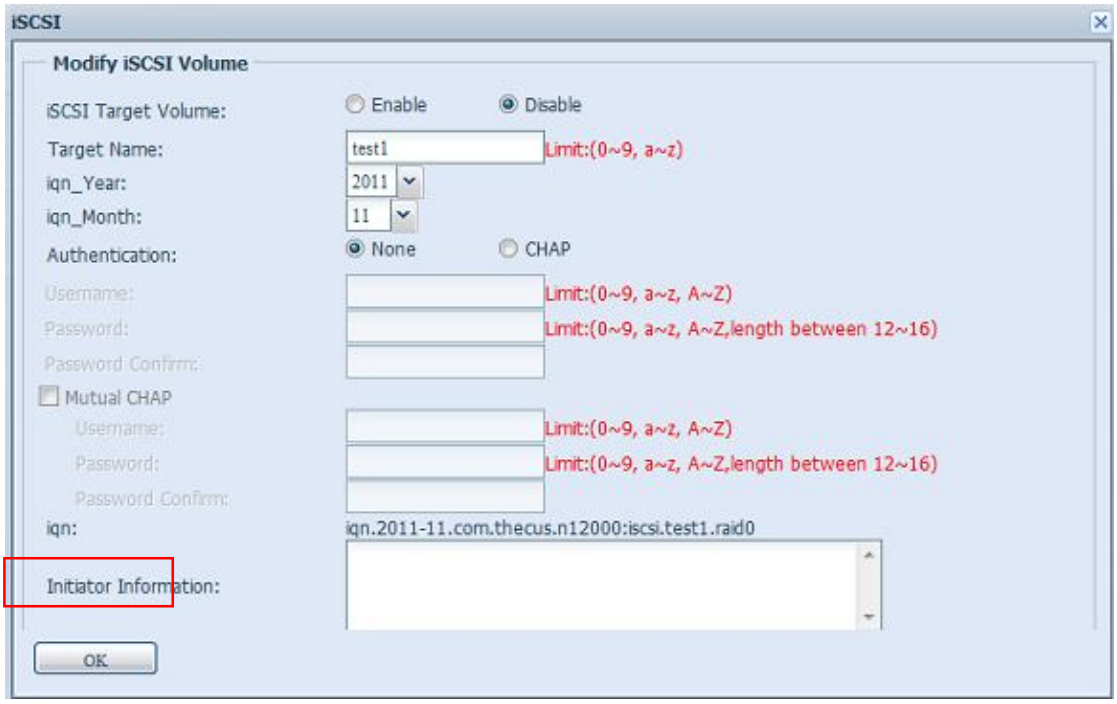
Modify iSCSI Volume

To modify iSCSI target on the current RAID volume, follow the steps below:

1. Under the **iSCSI Target List**, click ***Modify***.
   The **Modify iSCSI Volume** screen appears.

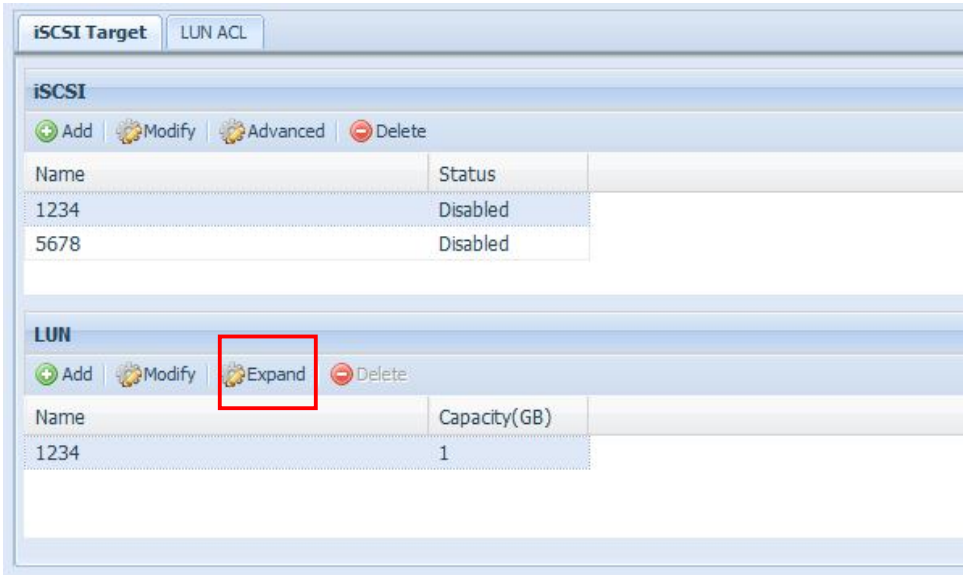


2. Modify your setting. Press **ok** to change.

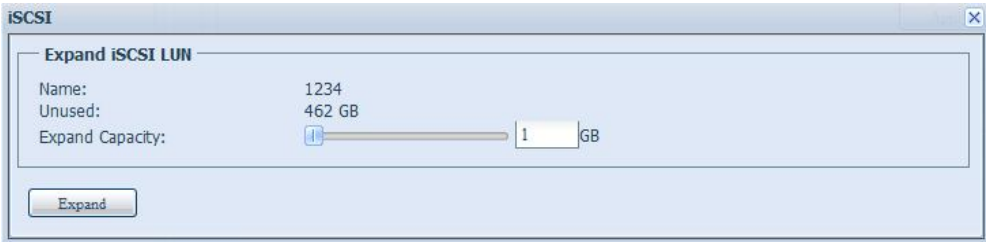


Expand Volume

The iSCSI volume is now able to expand its capacity from unused space (Instant Allocation mode only). From the volume list, simply select the iSCSI volume you like to expand and click the **Expand** button:



You will then see the dialog box displayed below. Drag the **Expand Capacity** bar to the size you want. Then press **Expand** to confirm the operation.



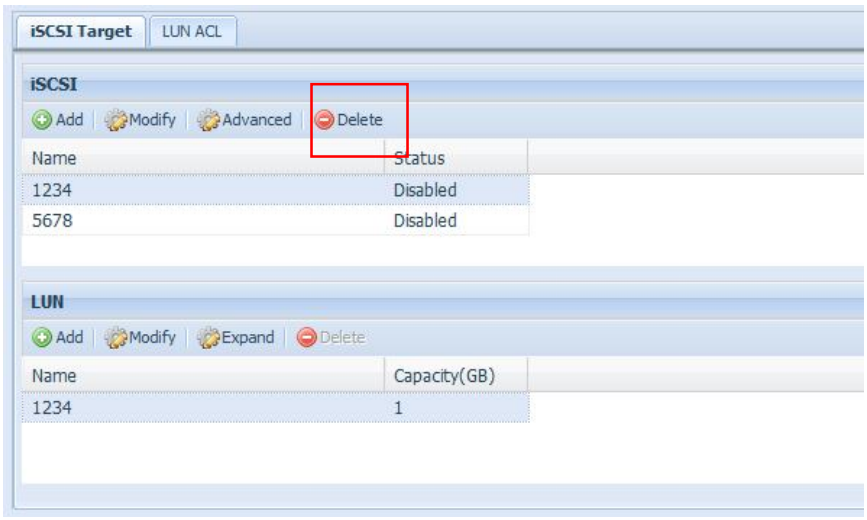
NOTE

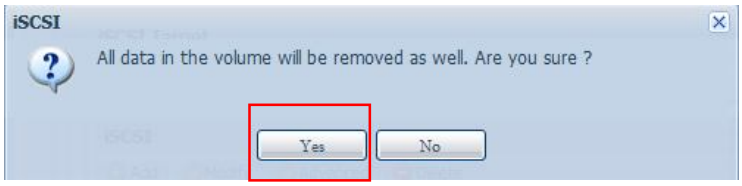
The iSCSI expand is only capable while iSCSI target volume is crested by "Instant Allocation". Created by "Thin Provisioning" has virtual space assigned in initial stage, so it has no expand capability.

Delete Volume

To delete volume on the current RAID volume, follow the steps below:

1. Under the **Volume Allocation List**, click ***Delete***.
   The **Space Allocation** screen appears.



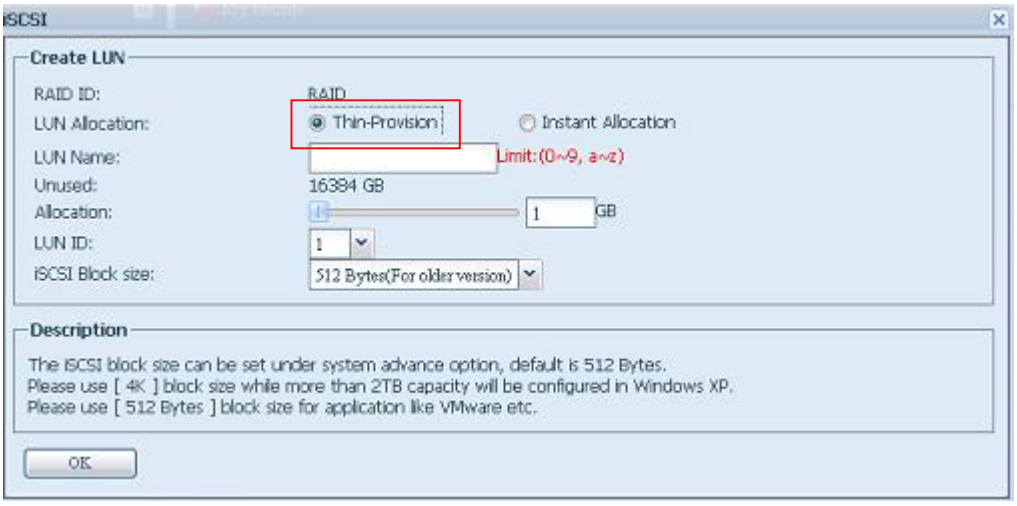


2. Press **YES**. All data in the volume will be removed.

iSCSI Thin-Provisioning

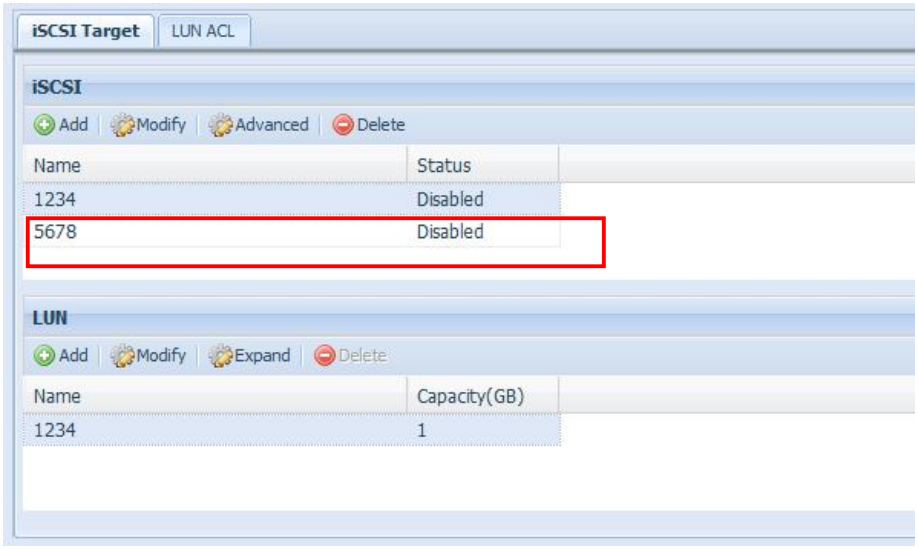
To select iSCSI Thin-Provision to create iSCSI target volume, it could maximum physical iSCSI target volume capacity usage and allowed virtually assign space to have more disks added while it needed.

To setup iSCSI thin-provisioning, simply select "Thin-Provisioning" mode from "Create LUN" setting screen.



Next, allocate capacity for iSCSI thin-provision volume by dragging the **Allocation** bar to the desired size.

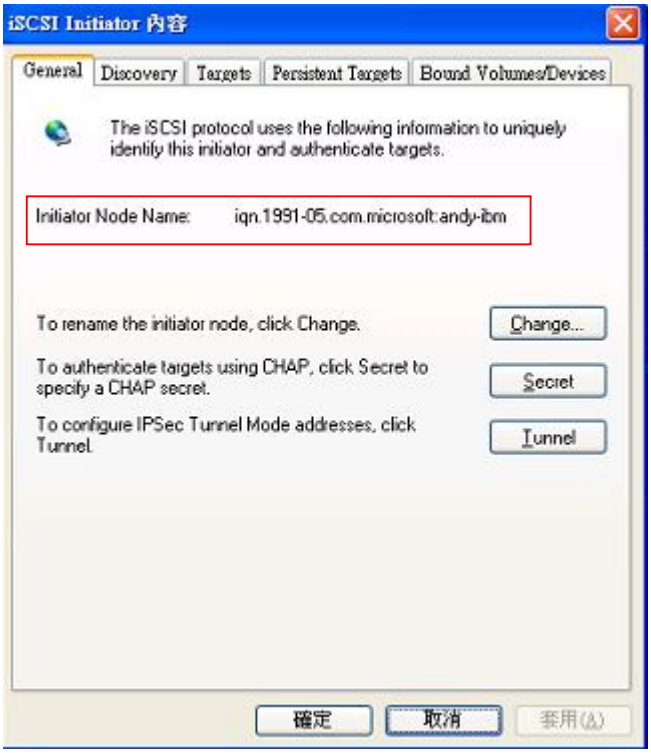
After the size has been determined, click **OK** to confirm. Now you will see the iSCSI thin-provisioning volume is available from the list. Please refer to the screenshot below.



Unlike creating "Instant Allocation" iSCSI target volumes which capacity has been physically allocated! With the iSCSI target volume creation under thin-provisioning can virtually be up to 16384GB (16TB).

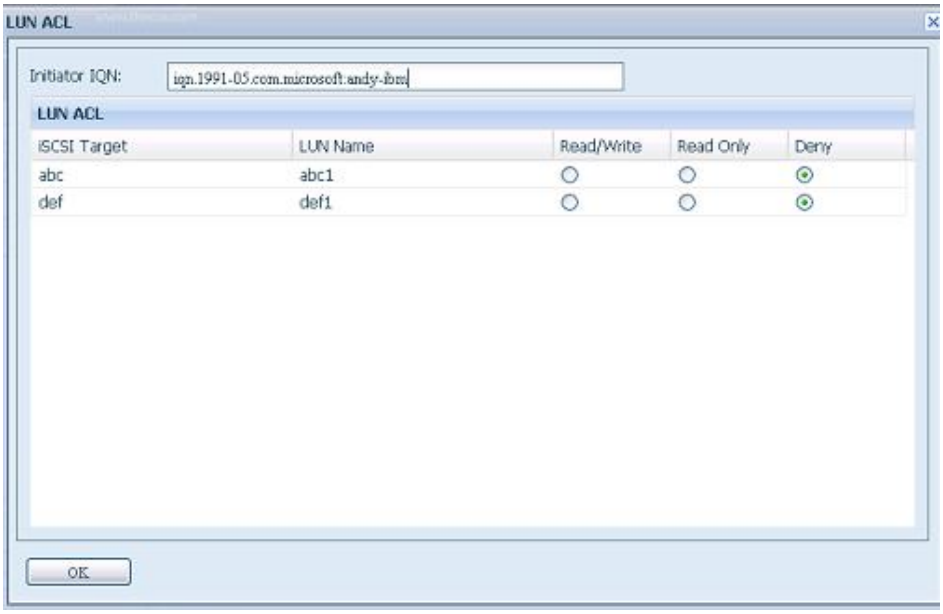
LUN ACL

After iSCSI target has been created, one more step away to complete iSCSI volume can be used. Under "LUN ACL", it needs to add "Initiator iqn" and setup ACL access privilege to determine the accessibility. Please refer the screen shot below for where "Initiator iqn" can be getting it from.

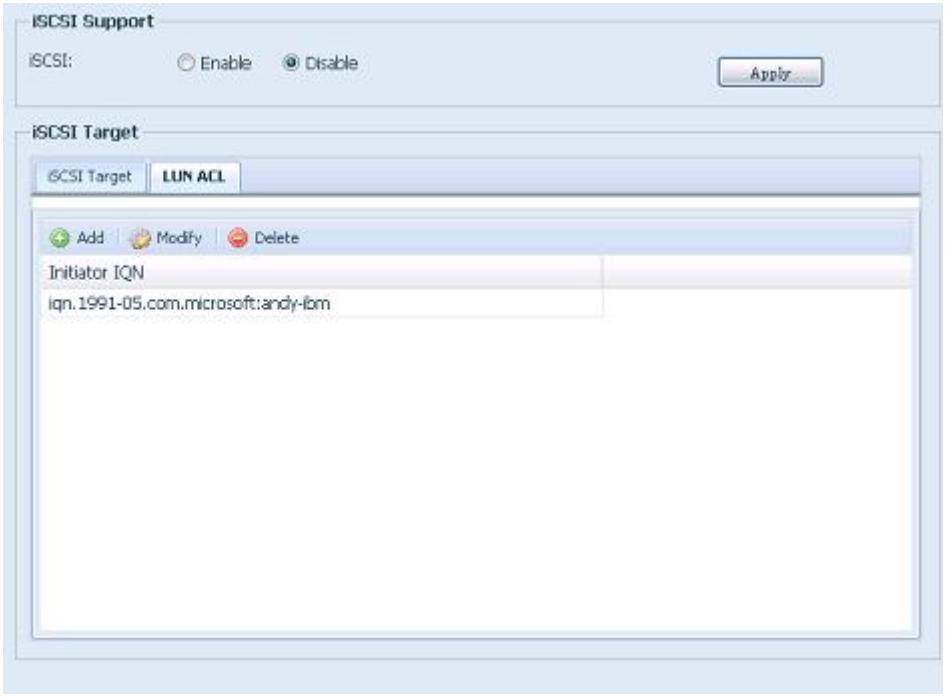


From the LUN ACL setting screen click "Add":

Next, input "Initiator iqn" and setup iSCSI target volume access privilege from available list then apply with OK button.



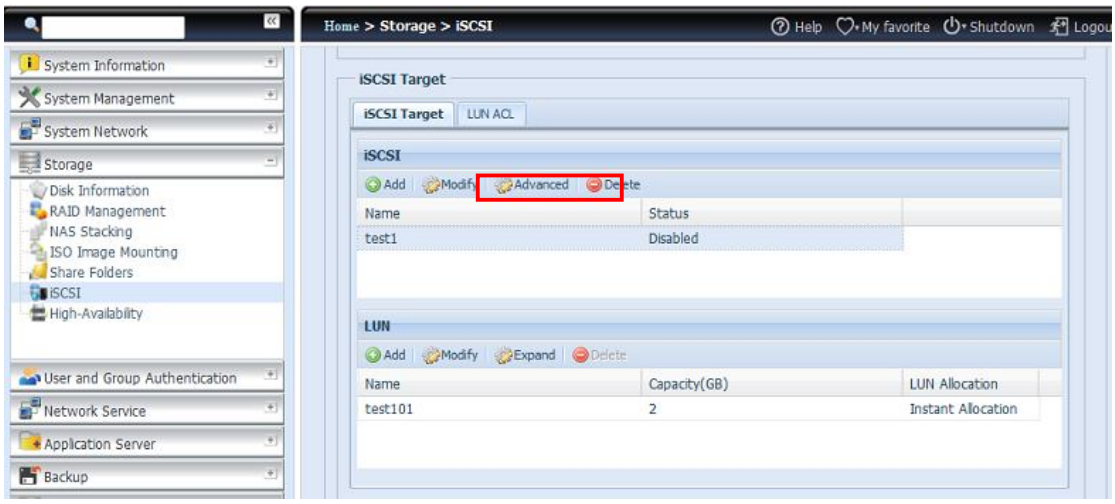
The accessible Initiator will listed as screen shot displayed below.



The listed "Initiator iqn" can be modified or deleted by selecte desired iqn and apply by associated button.

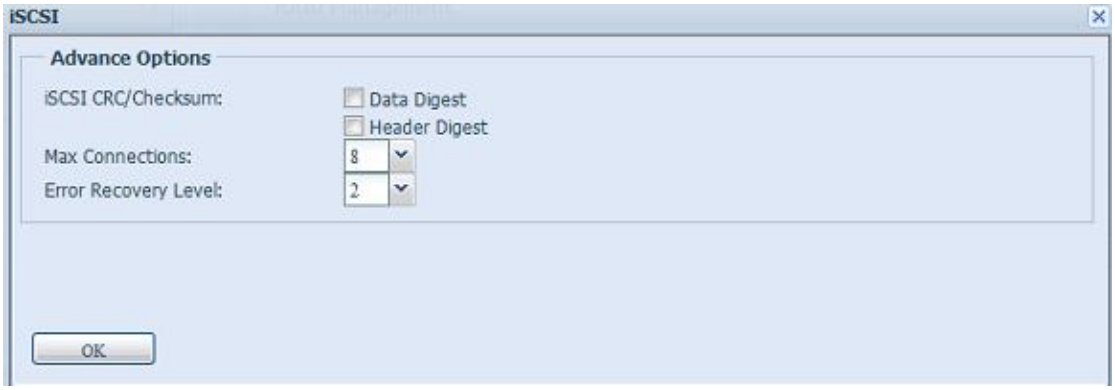
Advance Option

There are 3 options is currently allow Admin to Enable/Disable to operate Thecus IP storage associated with iSCSI setting. The details as listed in following screenshot. With the option changed, it will need to reboot system to activate.



iSCSI CRC/Checksum

To enable this option, the initiator can connect with "Data digest" and "Header digest" enabled.



Max Connections
The maximum number of connections iSCSI.

Error Recovery Level
The Error Recovery Level (ERL) is negotiated during a leading iSCSI connection login in traditional iSCSI (RFC 3720) and iSER (RFC 5046).

ERL=0: Session Recovery
ERL=0 (Session Recovery) is triggered when failures within a command, within a connection, and/or within TCP occur. This causes all of the previous connections from the failed session to be restarted on a new session by sending a iSCSI Login Request with a zero TSIHRestart all iSCSI connections on any failure.

ERL=1: Digest Failure Recovery
ERL=1, only applies to traditional iSCSI. For iSCSI/SCTP (which has its own CRC32C) and both types of iSER (so far), handling header and data checksum recovery can be disabled.

ERL=2: Connection Recovery
ERL=2, allows for both single and multiple communication path sessions within a iSCSI Nexus (and hence the SCSI Nexus) to actively perform realligence/retry on iSCSI ITTs from failed iSCSI connections. ERL=2 allows iSCSI fabrics to take advantage of recovery in all regards of transport level fabric failures, and in a completely OS independent fashion (i.e. below the host OS storage stack).

High-Availability (N12000 series/N16000 series Only)

HA keeps your data active on two separate systemss, Thecus Supports Active/Passive HA — provides a fully redundant instance of each node, which is only brought online when its associated primary node fails.

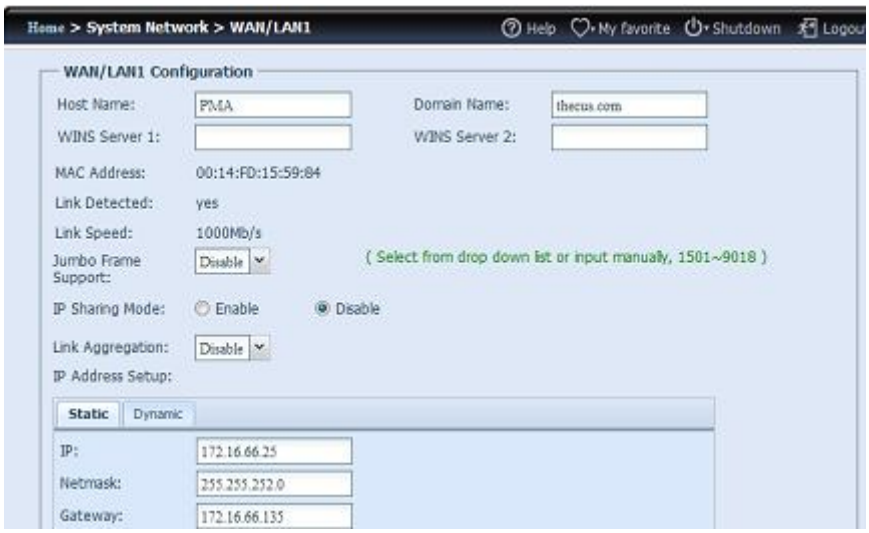
HA setup procedure:

HA needs two **identical** Thecus systems (same models and same hard disk slot installed) which capable for high availability feature to be setup one each for "Active" and "Standby" unit and both units have to build up RAID volume in prior.

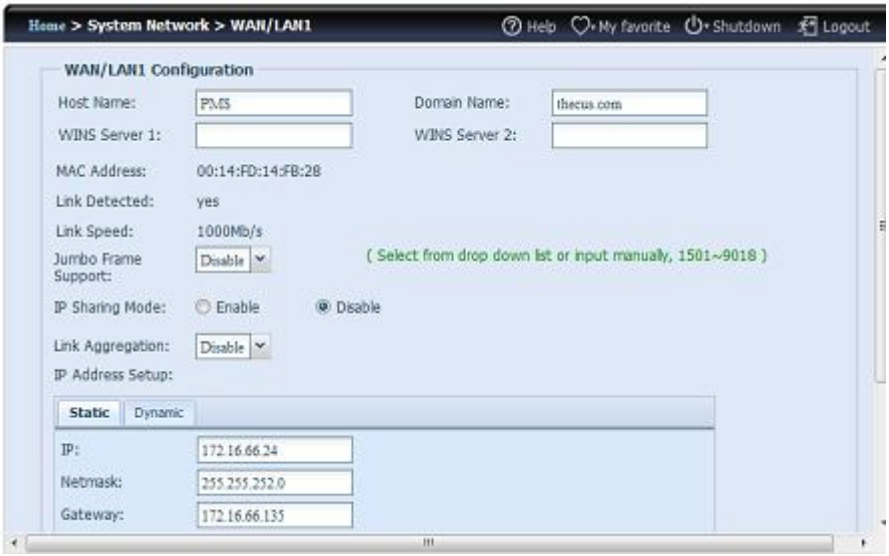
WARNING

Please be noticed if the system has been used as standalone and contained more than one RAID volume with data inside. Once it is going to use for HA, all of data will be destroyed.

Let’s take example for two Thecus Units.
Host name: PMA (172.16.66.25) and created 3.7GB RAID volume, will setup as Active server



Host name: PMS (172.16.66.24) and created 5.5GB RAID volume, will setup as Standby server



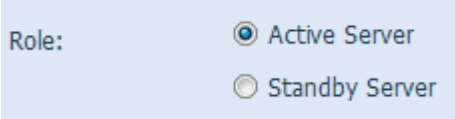
WARNING **The capacity of HA Standby server must be great than Active server or warning message will appear.**

Setup Active unit for HA, let's take example unit PMA (172.16.66.25):

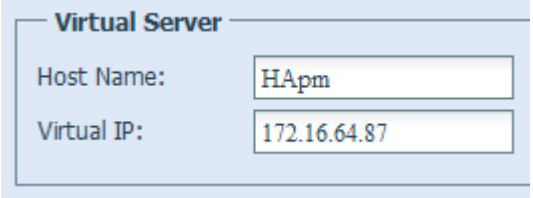
i. Login in to web UI of system 172.16.66.25 then go to "High Availability" HA configuration page under Storage category.

ii. Click on "Enable" radio button, then setting page will appear.

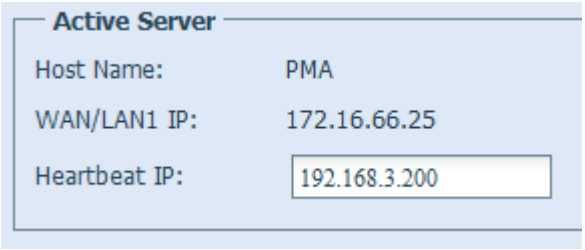
iii. Choose the server role of associated system, we are having example to have this unit as 'Active Server". So "Active Server" has checked.



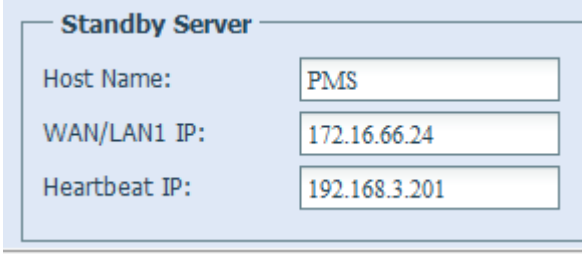
iv. Filled in the "Virtual Server" information for further access needed. We have this example "HApm" and "172.16.64.87" for virtual server name and virtual server IP accordingly.



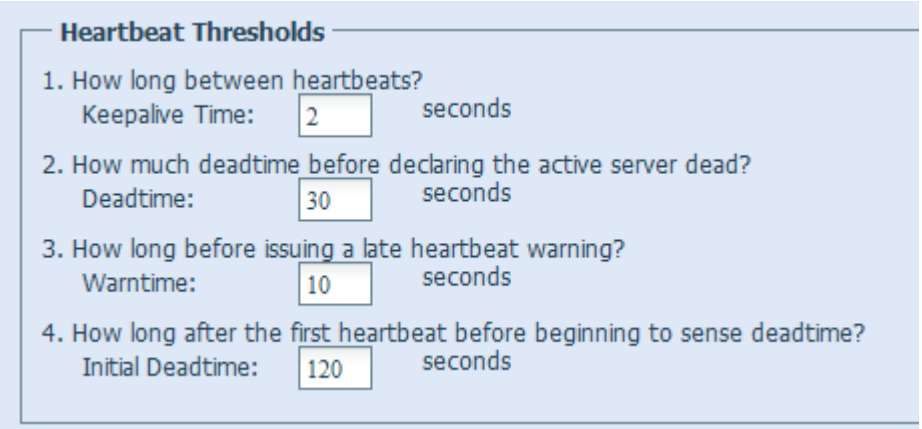
v. Filled in "Heartbeat" IP address for active server. It will have default value appear, no need to change in normal circumstance.



vi. Filled in the Standby server information of "Host name", "WAN/LAN1 IP" and "Heartbeaat IP".

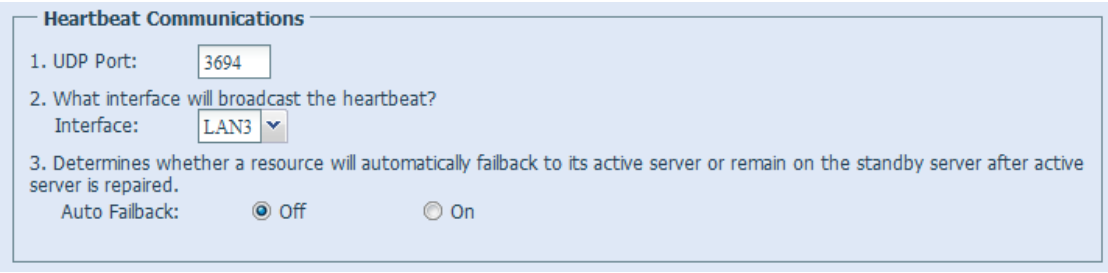


vii. The setting for "Heart Thresholds" has no need to change unless it has required in different circumstance.



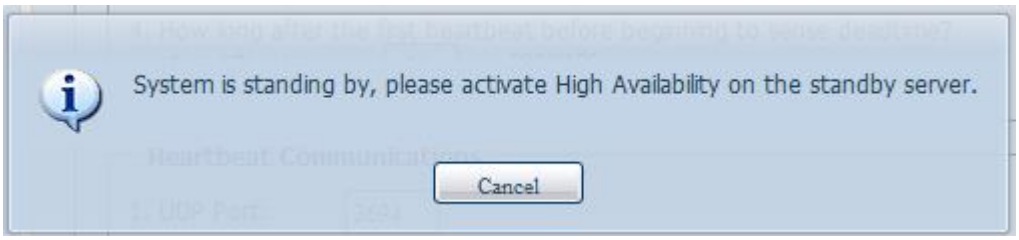
Heart Beats Configuration	
Item	**Description**
How long between heartbeats?	The keep a live directive sets the interval between heartbeat packets. It is specified according to the Heartbeat time syntax.
How much dead time before declaring the active server dead?	The dead ping directive is used to specify how quickly Heartbeat should decide that a ping node in a cluster is dead. Setting this value too low will cause the system to falsely declare the ping node dead. Setting it too high will delay detection of communication failure. This feature has been replaced by the more flexible pingd resource agent in Pacemaker, and should no longer be used.
How long before issue a late heartbeat warning?	The warn time directive is used to specify how quickly Heartbeat should issue a "late heartbeat" warning.
How long after the first heartbeat before beginning to sense dead time?	The init dead parameter is used to set the time that it takes to declare a cluster node dead when Heartbeat is first started. This parameter generally needs to be set to a higher value, because experience suggests that it sometimes takes operating systems many seconds for their communication systems before they operate correctly.

viii. The setting for "Heartbeat Communications"


Heartbeat Communications
1. UDP Port:
3694
2. What interface will broadcast the heartbeat?
Interface:
LAN3
3. Determines whether a resource will automatically failback to its active server or remain on the standby server after active server is repaired.
Auto Failback:
Off
On

Communications Configuration	
UDP	The udp port directive specifies which port Heartbeat will use for its UDP intra-cluster communication. The default value for this parameter is UDP 694 port.
Heartbeats interface	Select interfaces are used for heartbeat communications.
Auto Fail Back:	In legacy Heartbeat clusters, the auto failback option would determine whether a resource would automatically fail back to its "Active" node, or remain on whatever node is serving it until that node fails, or an administrator intervenes. The possible values for auto failback were: on - enable automatic failbacks off - disable automatic failback When auto failback is off (default): After the original active server is damaged and then returned to a healthy state, the original standby server will remain active and the original active server will go into standby mode. The servers will exchange roles. When auto failback is on: After the original active server is damaged and then returned to a healthy state, the original standby server will go back into standby mode and the original active server will become active again. The servers return to their original roles. With or without auto failback, synchronization will begin immediately without a break in service when the damaged server returns. The roles described above are assumed immediately and do not need to wait for synchronization. The virtual IP will always be mapped to the current active server.

ix. Click "Apply" and now Active server will prompt the message below to wait the "Standby" server setting to be completed.

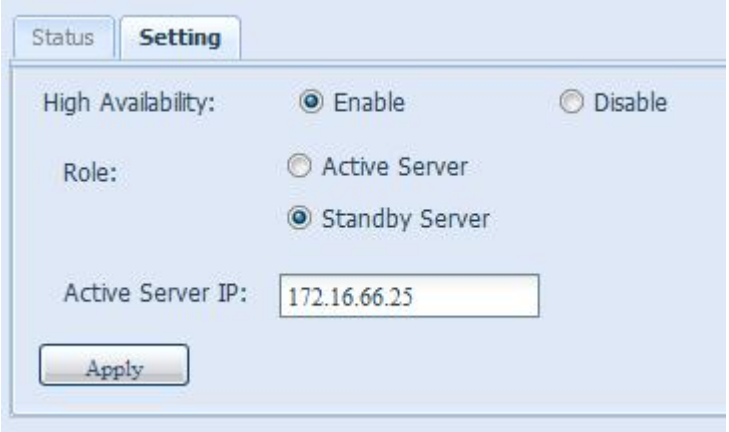


Setup Standby unit for HA, take example unit PMS (172.16.66.24):

x. Login in to web UI of system 172.16.66.24 then go to "High Availability" HA configuration page under Storage category.

xi. Click on "Enable" radio button then setting page will appear.

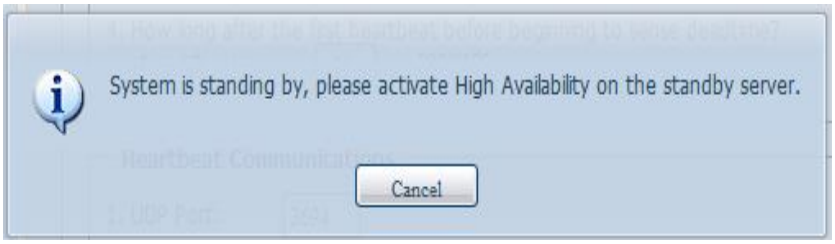
xii. Choose the server role of associated system, we are having example to have this unit as "Standby Server". So "Standby Server" has checked. Then carry on to filled in associated "Active Server" IP address.



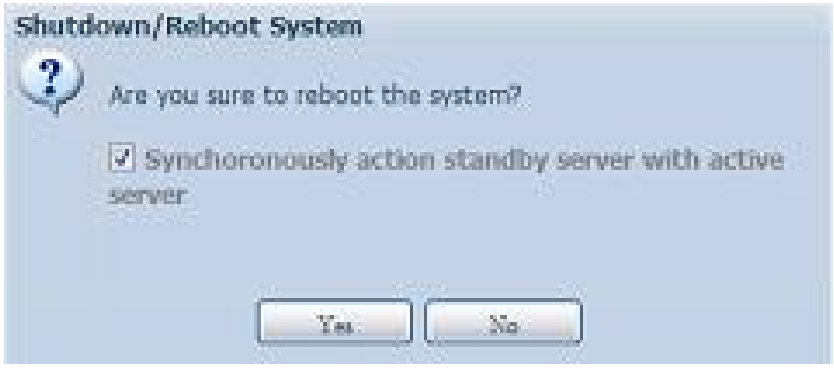
xiii. Click "Apply" and the Standby unit will start to check the Active sever status. If the Active server has replied correctly then the message will appear as below.

Please now check the Active Server unit and the interactive message will also appear to reboot both "Active" and 'Standby" server together to complete High Availability settings.

The last state of Active server is waiting for Standby server as screen shot below:



After Standby server has communicated with Active Server successfully, then the state will changed:



Click "Yes" to reboot both Active and Standby server.

If the communication is failed then you will have error message as below.

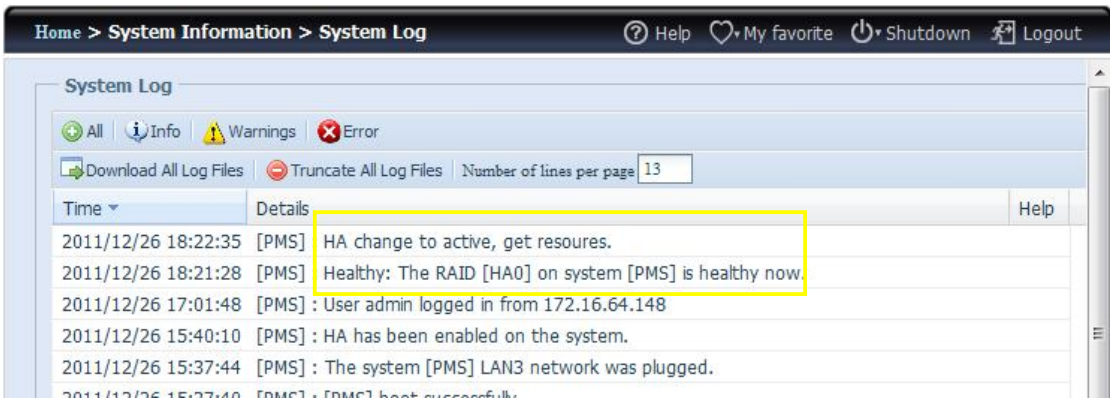
WARNING **Please be sure that "Standby" unit volume size must be larger then "Active" unit. Or the HA synchronize will result failed.**

NOTE LAN3 is used for heart beat in HA function to connect "Active" and "Standby" systems peer to peer.

Conditions in which the standby server will take over for the active server:

1. Active server RAID is damaged
2. Loss of the active server's data port connection
3. Active server goes down for any other reason

When the active server encounters the above-mentioned situations, the standby server (PMS) will immediately take over for the active server. The standby server's system log will show "HA changed to active, getting resources", and "Healthy: The RAID [HA] on system [PMS] is healthy now."

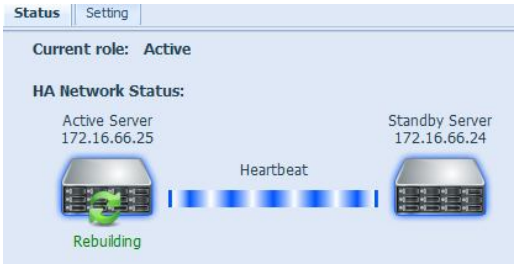

Home > System Information > System Log
Help
My favorite
Shutdown
Logout
System Log
All
Info
Warnings
Error
Download All Log Files
Truncate All Log Files
Number of lines per page 13
Time
Details
Help
2011/12/26 18:22:35 [PMS] HA change to active, get resoures.
2011/12/26 18:21:28 [PMS] Healthy: The RAID [HA0] on system [PMS] is healthy now.
2011/12/26 17:01:48 [PMS] : User admin logged in from 172.16.64.148
2011/12/26 15:40:10 [PMS] : HA has been enabled on the system.
2011/12/26 15:37:44 [PMS] : The system [PMS] LAN3 network was plugged.

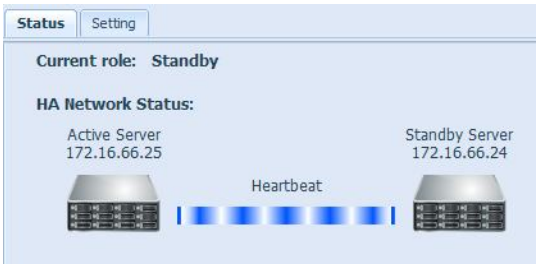
At this time, the virtual IP address will be mapped to the PMS system due to it is in an active state.

HA Ready:

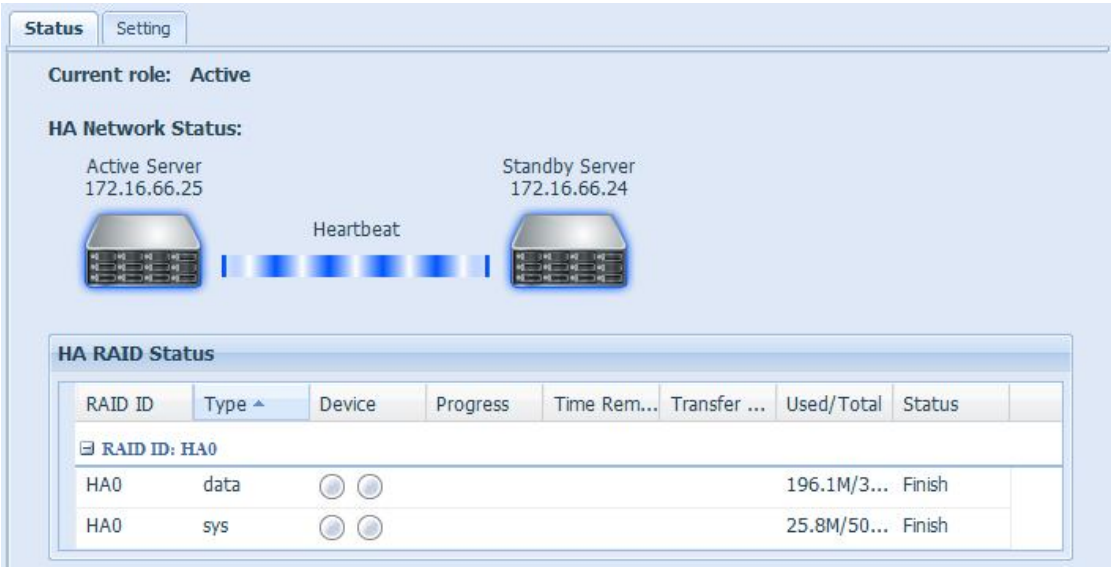
After both Active and Standby systems has reboot, the HA link status and HA RAID volume can be seen from HA status page.

From HA Active server "PMA (172.16.66.25)" it will denote the role of "Active" and "PMS (172.16.66.24)" will show Standby server.

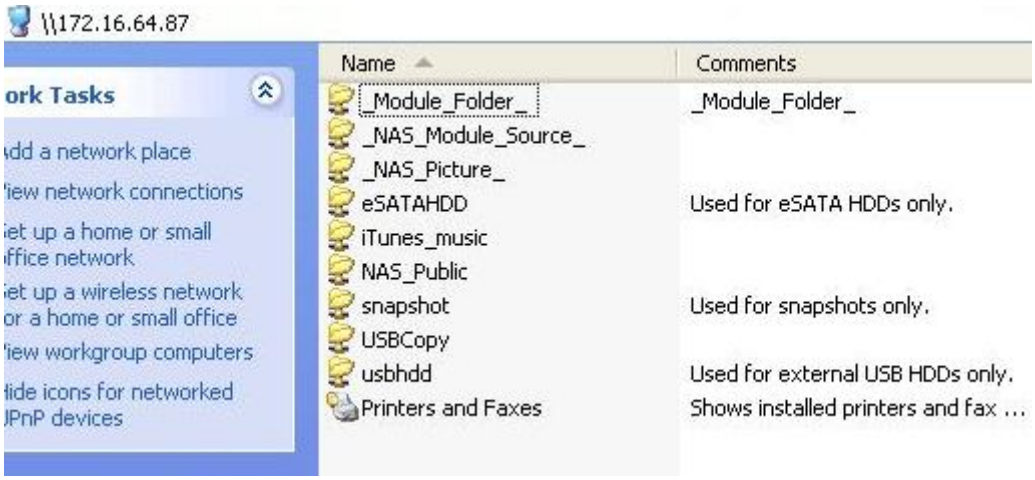




For the HA RAID volume status can be found as screen shot below, and it is ready to server:

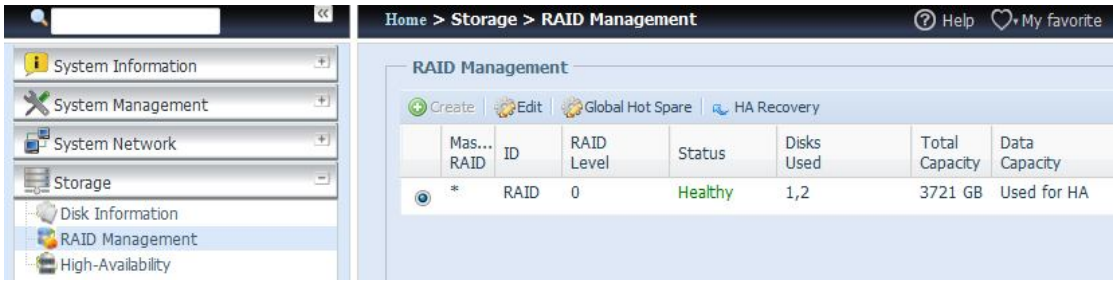


User can access this newly create HA system by its virtual IP, take Windows as example by put 172.16.65.87 or HApm then the available share will be listed as below:

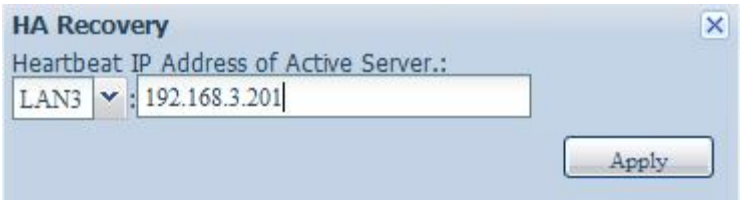


HA Recovery:

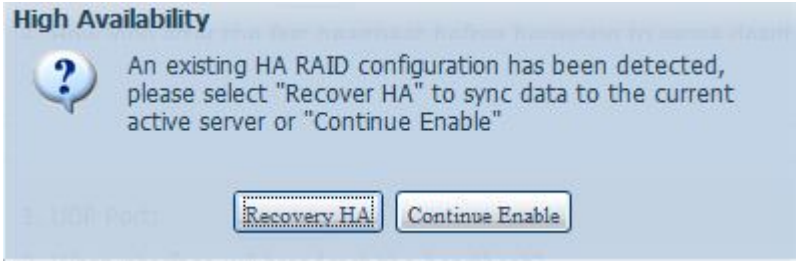
If one of HA member is went down earlier and like to recovery afterward. Simply go to the RAID management page and the "HA Recovery" icon is available.



Click on "HA Recovery" icon then system will prompt the box to require Active server heartbeat link IP address. After input the IP address and press Apply, the unit will be recovery fully.



The other circumstance is while HA enable button has checked, but system has detected it has previous HA configuration existed. Then the screen will prompt message box as below:


High Availability
An existing HA RAID configuration has been detected, please select "Recover HA" to sync data to the current active server or "Continue Enable"
Recovery HA
Continue Enable

If the other HA member is running smoothly, please choose "Recovery HA" to complete HA recovery. Or select "Continue Enable" to let both HA members has same action taking.

WARNING

If there are transfers in progress when the Active server encounters problems and the Standby server becomes active, the session will be stopped. Please contact your network administrator to determine whether or not your transfers were completed.

WARNING

When the original active server rejoins the HA environment, it will be updated with the newer data from the original standby server to synchronize for HA. Please be aware that the data on the original active server will be replaced by the data from the original standby server.

User and Group Authentication

The Thecus IP storage has built-in user database that allows administrators to manage user access using different group policies. From the **User and Group Authentication** menu, you can create, modify, and delete users, and assign them to groups that you designate.

ADS/NT Support

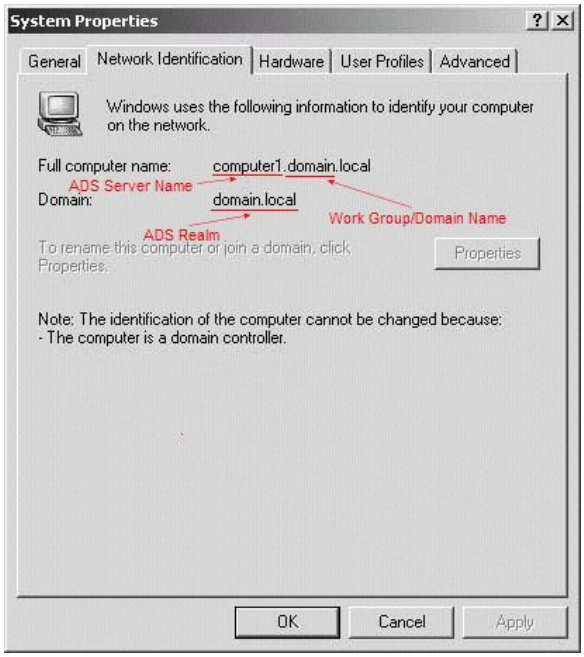
If you have a Windows Active Directory Server (ADS) or Windows NT server to handle the domain security in your network, you can simply enable the ADS/NT support feature; the Thecus IP storage will connect with the ADS/NT server and get all the information of the domain users and groups automatically. From the **Accounts** menu, choose ***Authentication*** item and the **ADS/NT Support** screen appears. You can to change any of these items and press ***Apply*** to confirm your settings.

A description of each item follows:

ADS/NT Support

Item	Description
Work Group / Domain Name	Specifies the SMB/CIFS Work Group / ADS Domain Name (e.g. MYGROUP).
ADS Support	Select Disable to disable authentication through Windows Active Directory Server.
ADS Server Name	Specifies the ADS server name (e.g. adservername).
ADS Realm	Specifies the ADS realm (e.g. example.com).
Administrator ID	Enter the administrators ID of Windows Active Directory, which is required for Thecus IP storage to join domain.
Administrator Password	Enter the ADS Administrator password.
Apply	To save your settings.

To join an AD domain, you can refer the figure and use the example below to configure the Thecus IP storage for associated filed input:



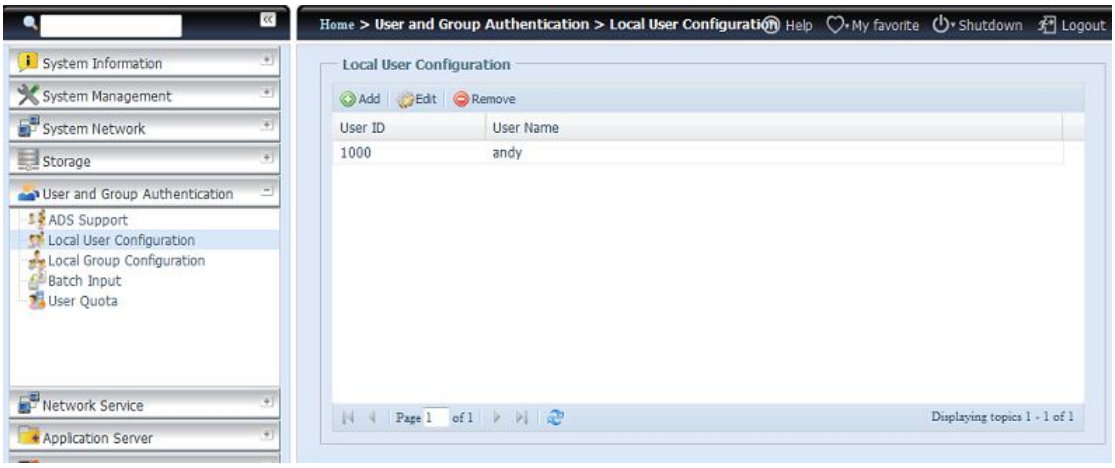
AD Domain Example	
Item	**Information**
Work Group / Domain Name	domain
ADS Support	Enable
ADS Server Name	Computer1
ADS Realm	Domain.local
Administrator ID	Administrator
Administrator Password	**********

NOTE

- The DNS server specified in the WAN/LAN1 configuration page should be able to correctly resolve the ADS server name.
- The time zone setting between Thecus IP storage and ADS should be identical.
- The system time difference between Thecus IP storage and ADS should be less than five minutes.
- The Administrator Password field is for the password of ADS (Active Directory Server) not Thecus IP storage.

Local User Configuration

From the **Accounts** menu, choose the **User** item, and the **Local User Configuration** screen appears. This screen allows you to **Add**, **Edit**, and **Remove** local users.



Local User Configuration	
Item	**Description**
Add	Press the ***Add*** button to add a user to the list of local users.
Edit	Press the ***Edit*** button to modify a local user.
Remove	Press the ***Remove*** button to delete a selected user from the system.

Add Users

1. Click on the ***Add*** button on **Local User Configuration** screen, and **Local User Setting** screen appears.

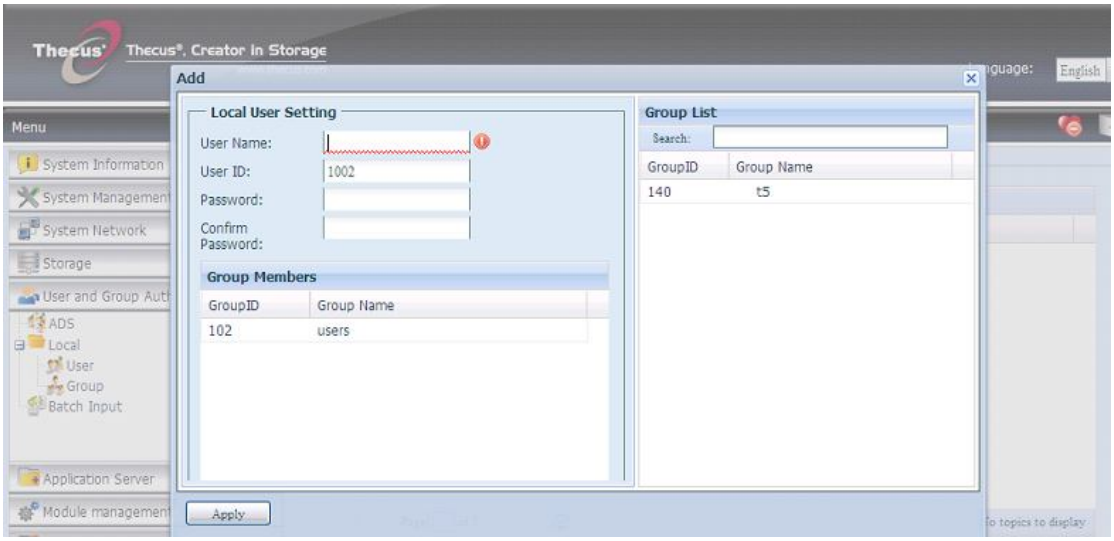
2. On the **Local User Setting** screen, enter a name in the **User Name** box.

3. Enter a **User ID** number or left to use system default value.

4. Enter a password in the **Password** box and re-enter the password in the **Confirm** box.

5. Select which group the user will belong to. **Group Members** is a list of groups this user belongs to. **Group List** is a list of groups this user does not belong to. Use the **<<** or **>>** buttons to have this user join or leave a group.

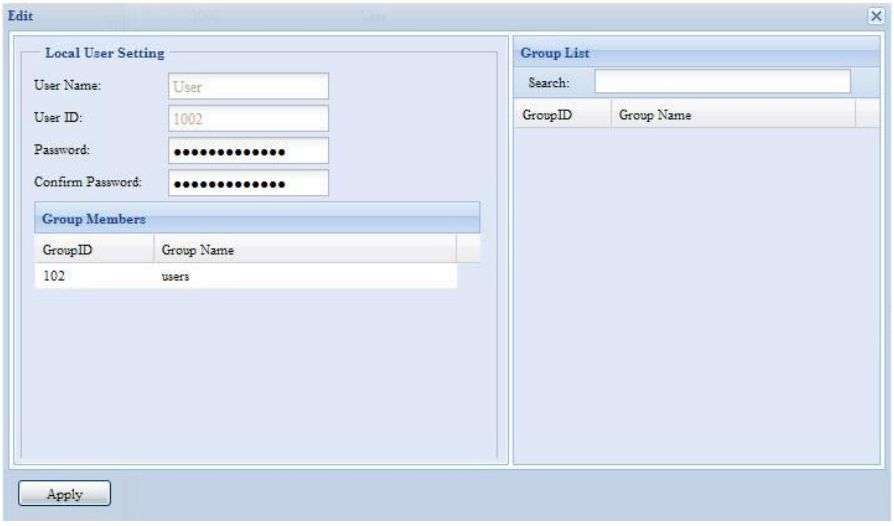
6. Press the ***Apply*** button and the user is created.



NOTE All users are automatically assigned to the 'users' group.

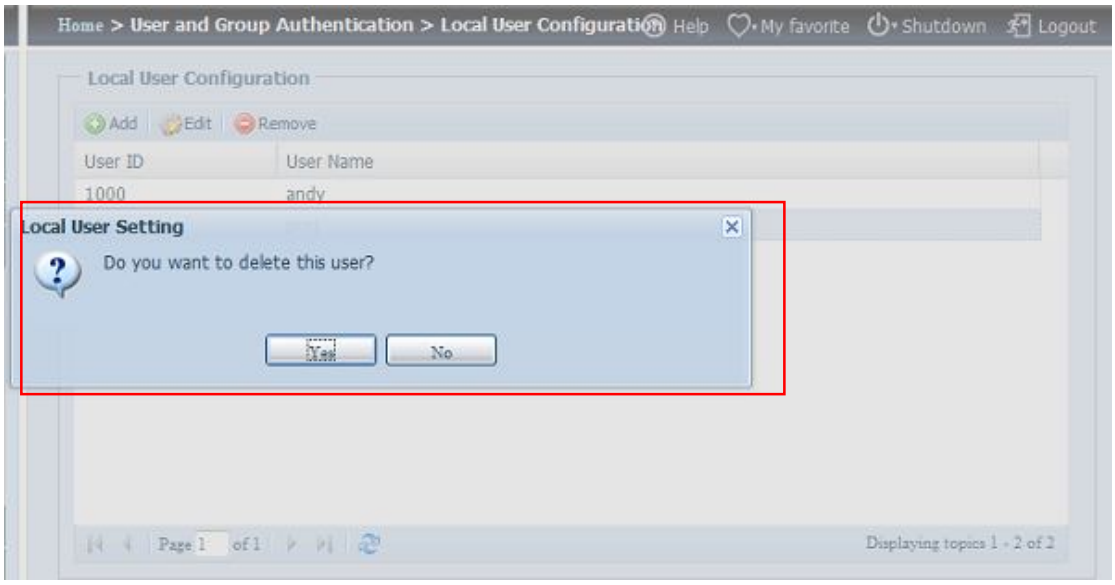
Edit Users

1. Select an existing user from the **Local User Configuration** screen.
2. Click on the ***Edit*** button, and **Local User Setting** screen appears.
3. From here, you can enter a new password and re-enter to confirm, or use the **<<** or **>>** buttons to have this user join or leave a group. Click the ***Apply*** button to save your changes.



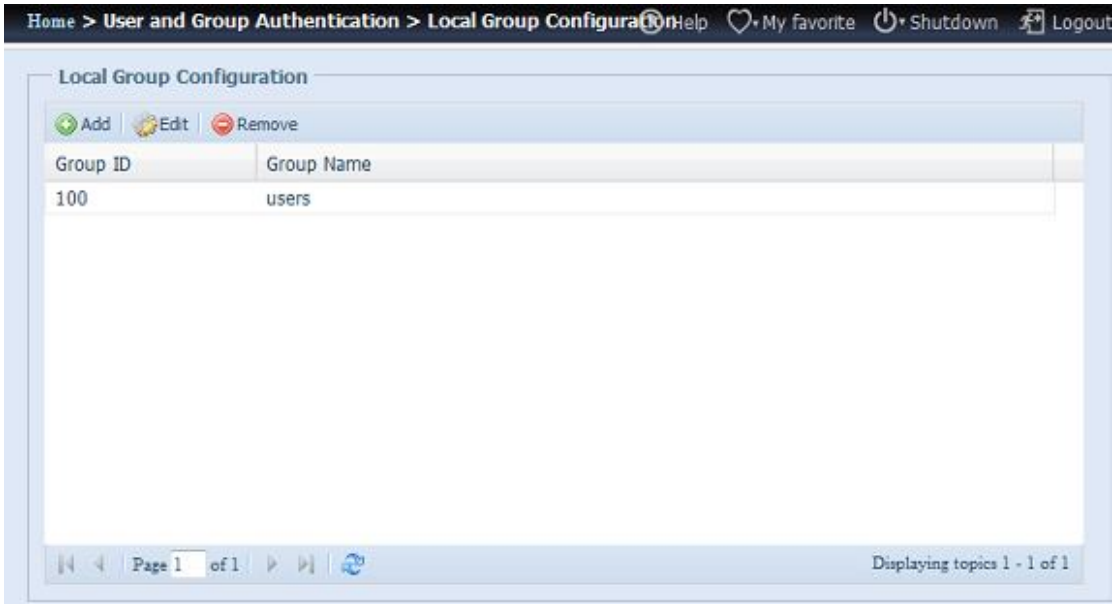
Remove Users

1. Select an existing user from the **Local User Configuration** screen.
2. Click on ***Remove*** button and the user is deleted from the system.



Local Group Configuration

From the **Accounts** menu, choose the ***Group*** item, and the **Local Group Configuration** screen appears. This screen allows you to **Add**, **Edit**, and **Remove** local groups.

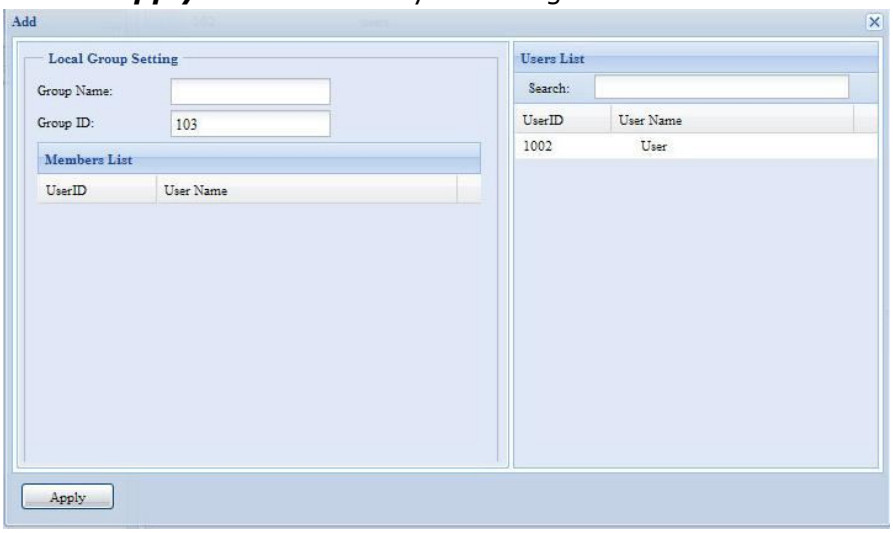


Local Group Configuration	
Item	**Description**
Add	Press the ***Add*** button to add a user to the list of local groups.
Edit	Press the ***Edit*** button to modify a selected group from the system.
Remove	Press the **Remove** button to delete a selected group from the system.

Add Groups

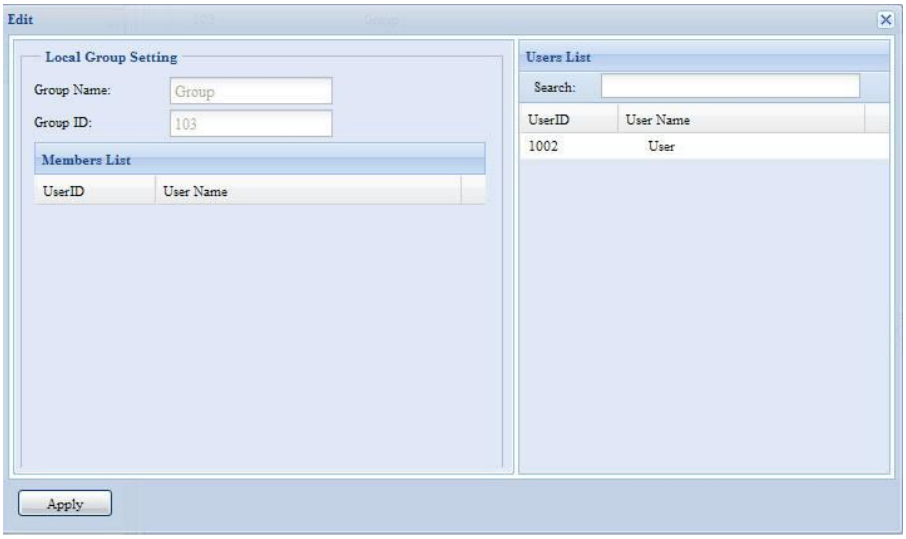
1. On the **Local Group Configuration** screen, click on the ***Add*** button.
2. The **Local Group Setting** screen appears.
3. Enter a **Group Name**.
4. Enter a **Group ID** number. If left blank, the system will automatically assign one.

5. Select users to be in this group from the **Users List** by adding them to the **Members List** using the **<<** button.
6. Click the ***Apply*** button to save your changes.



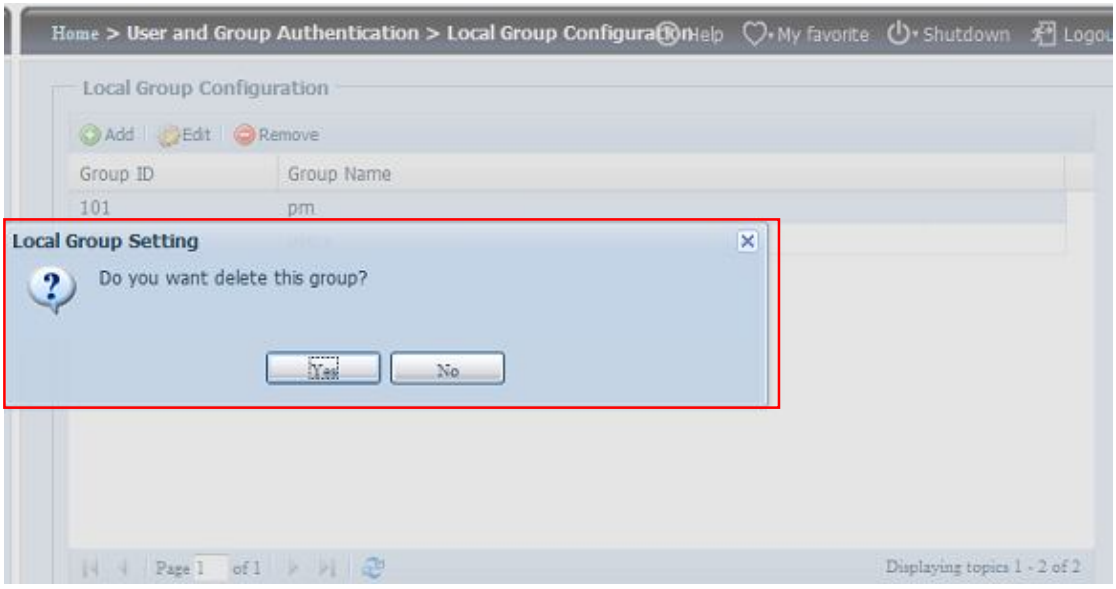
Edit Groups

1. On the **Local Group Configuration** screen, select a group name from the list.
2. Press the ***Edit*** button to modify the members in a group.
3. To add a user into a group, select the user from the **Users List**, and press the **<<** button to move the user into the **Members List**.
4. To remove a user from a group, select the user from **Members List**, and press the **>>** button.
5. Click the ***Apply*** button to save your changes.



Remove Groups

1. On the **Local Group Configuration** screen, select a group name from the list.
2. Press ***Remove*** to delete the group from the system.



Batch Create Users and Groups

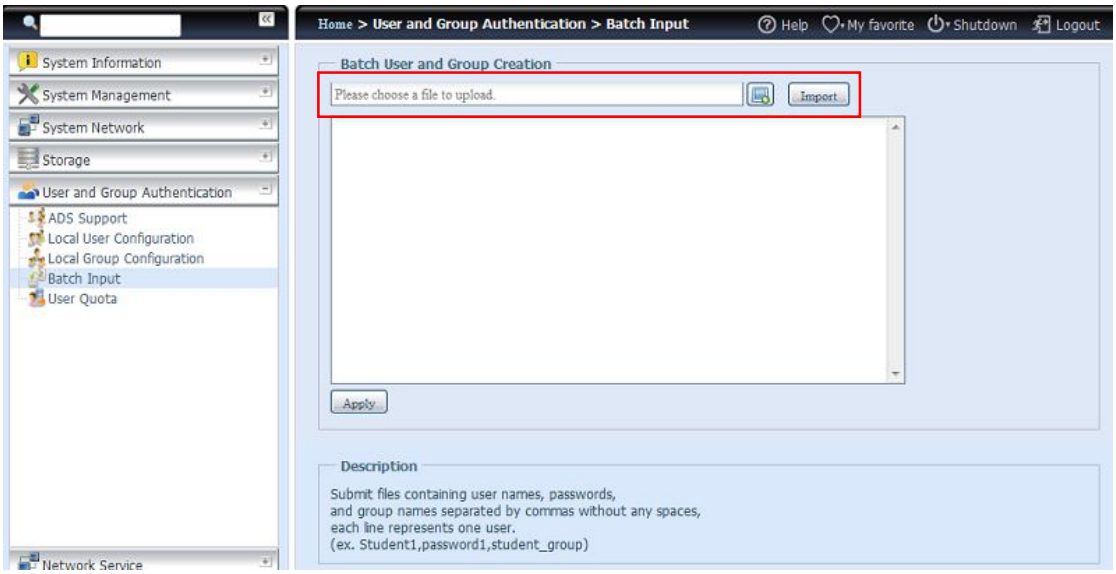
The Thecus IP storage can also add users and groups in batch mode. This enables you to conveniently add numerous users and groups automatically by importing a simple comma-separated plain text (*.txt) file.

From the **Accounts** menu, click ***Batch Mgmt*** and the **Batch Create Users and Groups dialogue** will appear. To import your list of users and groups, follow these steps:

1. Click ***Browse…*** to locate your comma-separated text file.
   The information in the text file should follow this format:

   ```
   [USERNAME], [PASSWORD], [GROUP]
   ```

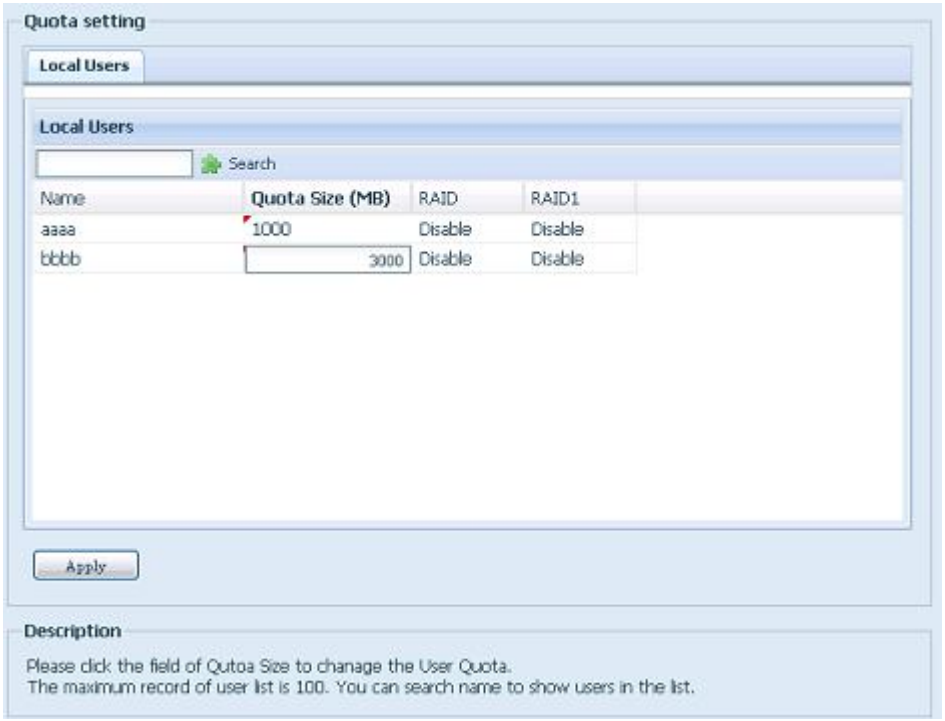
2. Click ***Open***.
3. Click ***Import*** to begin the user list import.



User Quota

The Thecus IP storage has supported local or AD users with its quota limitation in each RAID volume of system. Simply to enable this function by clicking "Enable" then apply it.

Next, each user can be setup global quota size for each RAID volume. Simply click on "Quota Size" for each user and input desired capacity. After setup complete, please click on "Apply" to activate user quota size.



User and Group Backup

The user and group backup feature is allowed system users and groups been backup to other location and restore it while needed.

Please be noticed when restore previous backup users and groups, the current users and groups list will be replaced from this restore file's contents.

LDAP Support

The LDAP is the other way to authenticate login users who has joined LDAP server, filled in the LDAP server information and get LDAP authentication started. Please be sure that LDAP server must be have both Samba sam and POSIX ObjectClass account.

A description of each item follows:

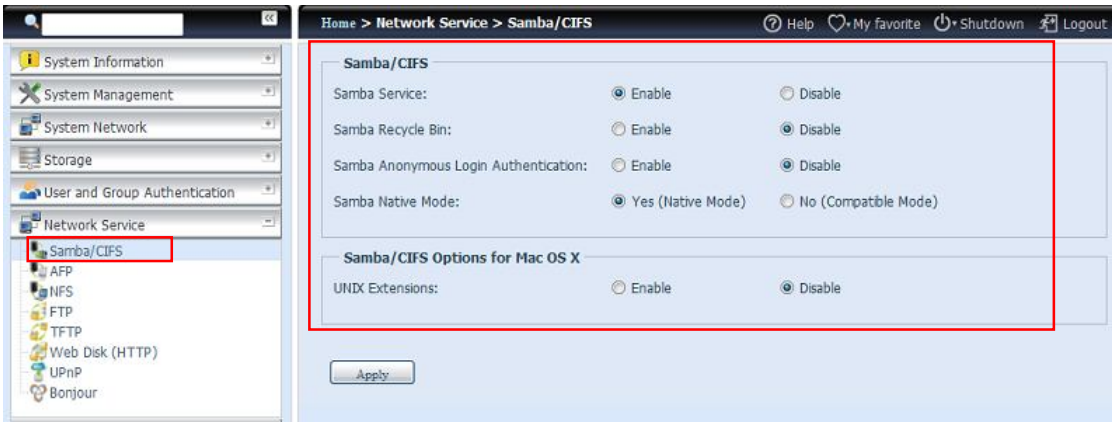
LDAP Support	
Item	**Description**
LDAP Service	**Enable** or **Disable** LDAP service.
LDAP Server IP	Input LDAP server IP address.
Base Domain	Input base domain information ex. dc=tuned, dc=com, dc=tw
Manager	Input manager's name.
Password	Input manager's passowrd
Apply	Click ***Apply*** to save your changes.
Check ObjectClass	Click this checkbox to ensure LDAP server having Samba sam and POSIX account or it may not working properly for LDAP client authentication.

Network Service

Use the **Network** Service menu to make network service support settings.

Samba / CIFS

There are options is currently allow Admin to Enable/Disable to operate Thecus IP storage associated with Samba / CIFS protocol. With the option changed, it will need to reboot system to activate.



Samba Service

Used for letting the operating system of UNIX series and SMB/CIFS of Microsoft Windows operating system (Server Message Block / Common Internet File System).Do the link in network protocol. Enable or Disable SMB/CIFS protocol for Windows, Apple, Unix drive mapping.

NOTE

- In some environments, due to security concerns, you may wish to disable SMB/CIFS as a precaution against computer viruses.

Samba Recycle Bin

The Thecus IP storage is supported recycle bin via SMB/CIFS protocol. Simply enable it then all of deleted files/folders will reside in the ".recycle" folder with hidden attribution in each share.

In general, Windows has default to invisible all of hidden folders/files. So please enable this option to view ".recycle" folder.

Samba Anonymous Login Authentication

To enable this option, no matter there is share folder has been created in public access. The user account and password is needed from system to access under SMB/CIFS protocol. On the other hand, no more anonymous login is allowed.

Samba Native mode

The Thecus IP storage is supported Samba mode options. In the ADS environment with "Native" mode selected then Thecus IP storage is capable to become local master position.

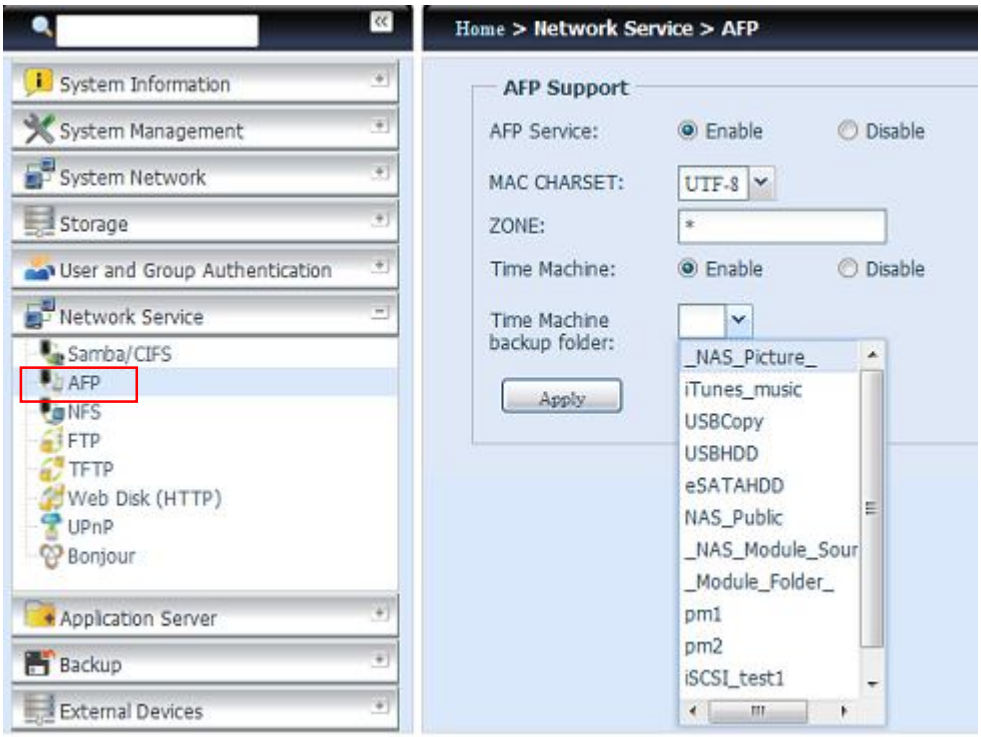
UNIX Extension

The default is enable for Samba usage, with situation using Mac OSX with smb connection may have permission issue. When it happened, please setup "UNIX Extension" disable to get issue solved.

AFP (Apple Network Setup)

From the **System Network** menu, choose the ***AFP*** item, and the **AFP Support** screen appears. This screen displays the configuration items for the Apple Filing

Protocol. You can change any of these items and press ***Apply*** to confirm your settings.



A description of each item follows:

Apple Network Configuration	
Item	**Description**
AFP Server	Enable or disable Apple File Service to use Thecus IP storage with MAC OS-based systems.
MAC CHARSET	Specifics the code page from drop down list
Zone	Specifies Zone for Applet Talk service. If your AppleTalk network uses extended networks and is assigned with multiple zones, assign a zone name to Thecus IP storage. If you do not want to assign a network zone, enter an asterisk (*) to use the default setting.
Time Machine	Enable checked box while you like to backup you MAC system to have Thecus IP storage as MAC time machine
Time Machine backup folder	Select from drop down list to designate the folder for time machine backup destination

NFS Setup

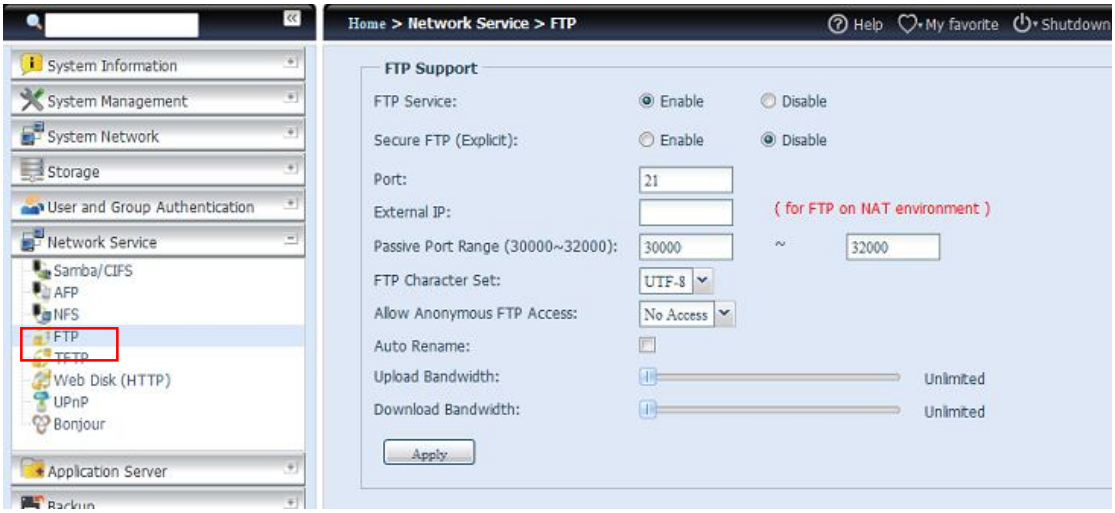
From the **System Network** menu, choose the ***NFS*** item, and the **NFS Support** screen appears. The Thecus IP storage can act as an NFS server, enabling users to download and upload files with the favorite NFS clients. Press ***Apply*** to confirm your settings.

A description of each item follows:

NFS Server Setting	
Item	**Description**
NFS	**Enable** or **Disable** NFS support.
Apply	Click ***Apply*** to save your changes.

FTP

Thecus IP storage can act as a FTP server, enabling users to download and upload files with their favorite FTP programs. From the **System Network** menu, choose the ***FTP*** item, and the **FTP** screen appears. You can change any of these items and press ***Apply*** to confirm your settings.



A description of each item follows:

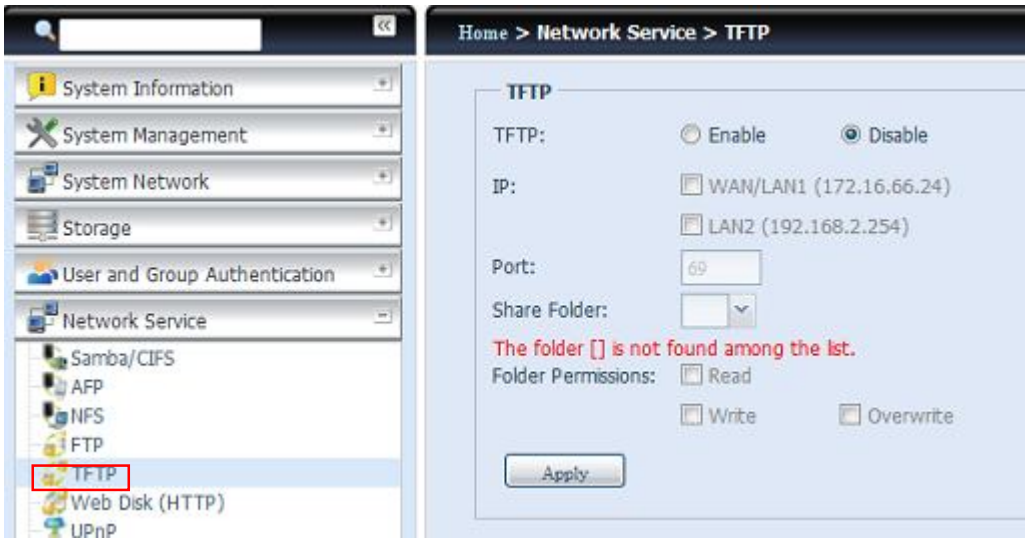
FTP	
Item	**Description**
FTP	Enable FTP Service on Thecus IP storage.
Security FTP	Enable or disable Security FTP, be sure the client FTP software has also security FTP setting enabled.
Port	Specifies the port number of an incoming connection on a non-standard port.
External IP	Input the public IP address of router while Thecus secure FTP server has been enabled. It could help to response ftp client with correct communicate information.
Passive Port Range (30000-32000)	limited port range for the FTP server to use.
FTP ENCODE	If your FTP client or operating system does not support Unicode (e.g. Windows® 95/98/ME or MAC OS9/8), select the same

	encoding as your OS here in order to properly view the files and directories on the server. Available options are BIG5, HZ, GB2312, GB18030, ISO, EUC-JP, SHIFT-JIS and UTF-8.
Allow Anonymous FTP Access	**Upload/Download:** Allow anonymous FTP users to upload or download files to/from public folders. **Download:** Allow anonymous FTP users to download files from public folders. **No access:** Block anonymous FTP user access.
Auto Rename	If checked, the system will automatically rename files that are uploaded with a duplicate file name. The renaming scheme is `[filename].#`, where `#` represents an integer.
Upload Bandwidth	You may set the maximum bandwidth allocated to file uploads. Selections include **Unlimited, 1 ~ 32 MB/s.**
Download Bandwidth	You may set the maximum bandwidth allocated to file downloads. Selections include **Unlimited, 1 ~ 32 MB/s.**

To access the share folder on Thecus IP storage, use the appropriate user login and password set up on the **Users** page. Access control to each share folder is set up on the **ACL** page (***Storage Management*** > **Shore *Folder*** > ***ACL***).

TFTP

Thecus IP storage can act as a TFTP server, enabling users to download and upload files with their favorite TFTP programs. From the **System Network** menu, choose the ***TFTP*** item, and the **TFTP** screen appears. You can change any of these items and press ***Apply*** to confirm your settings.

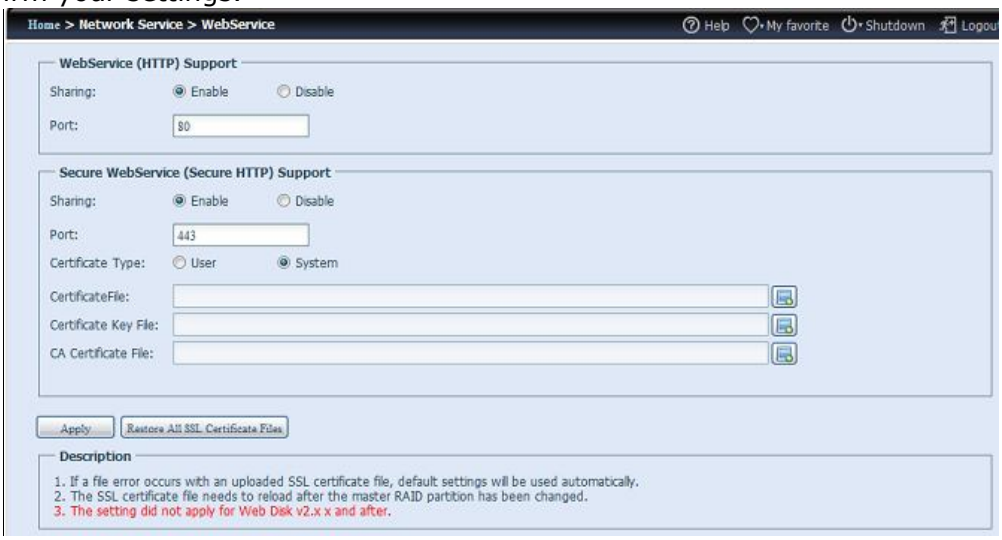


A description of each item follows:

TFTP	
Item	**Description**
TFTP	Enable TFTP Service on the Thecus IP storage.
IP	Checked WAN/LAN1 or LAN2 to enable port use
Port	Specifies the port number of an incoming connection on a non-standard port.
Share Folder	Select the file stored folder, it can not be empty.
Folder Permission	Select the folder permission

WebService

From the **Network Service** menu, choose the **WebService** item, and the **WebService Support** screen appears. This screen displays the service support parameters of the system. You can change any of these items and press ***Apply*** to confirm your settings.



A description of each item follows:

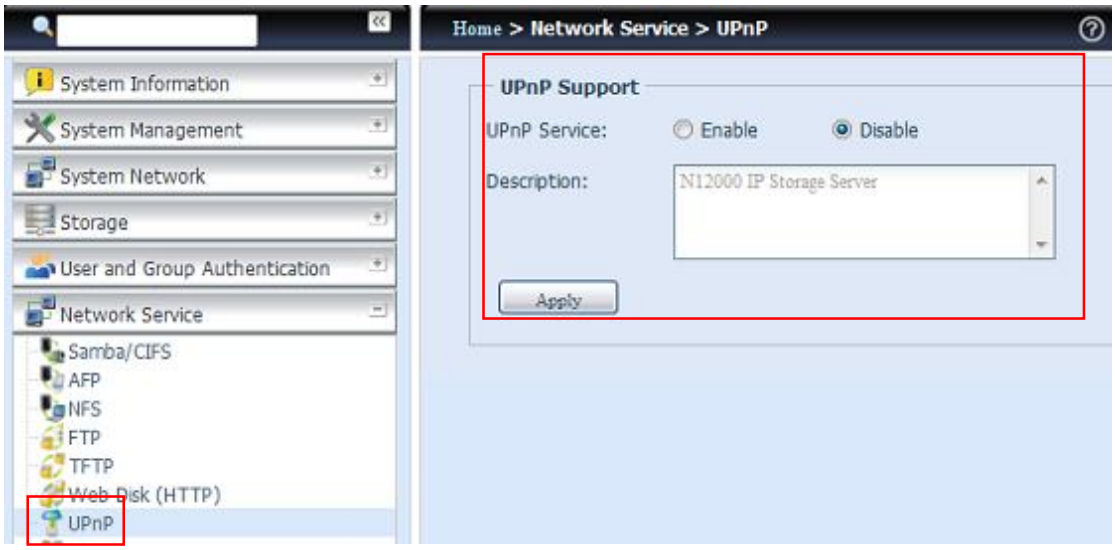
Web Service	
Item	**Description**
HTTP (WebDisk) Support	Enable or disable WebDisk support. Enter the port number if this option is enabled. The port number is default 80.
HTTPs (Secure WebDisk) Support	Enable or disable secure WebDisk support. Enter the port if this option is enabled.
Certificate Type	Select "User" if there is available Certification ID ex. Apply from VeriSign. Or using system default by select "System".
Certificate File	Upload Certificate File if choose Certificate type "User".
Certificate Key File	Upload Certificate Key File if choose Certificate type "User".
CA Certificate File	Upload CA Certificate File if choose Certificate type "User".
Restore All SSL Certificate Files	Click to set back to default certification details.
Apply	Click "Apply" to confirm the changes.

NOTE

- Disable HTTP support and Enable Secure HTTP support to guarantee secure access.

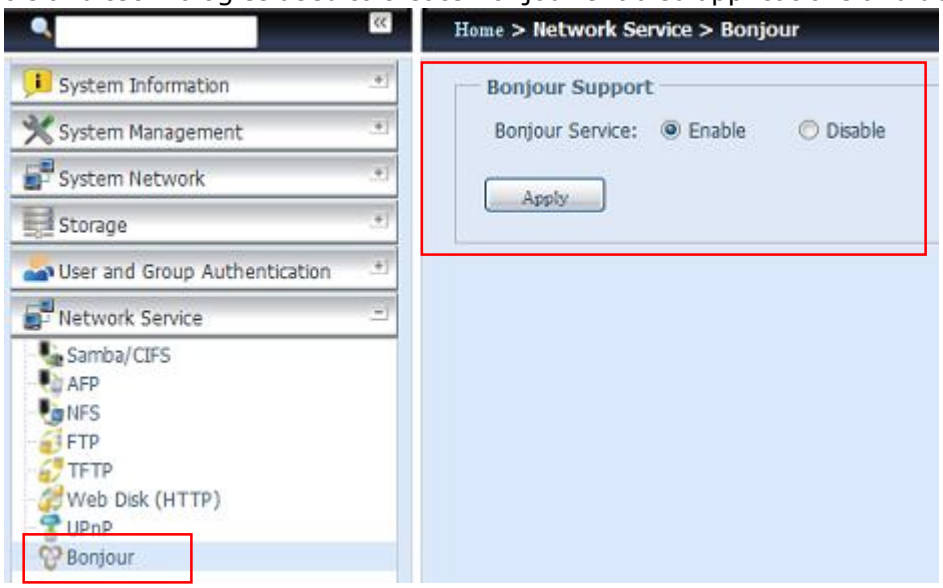
UPnP

This device supports UPnP Media server, which allows users to play media files with UPnP client (ex. DMA devices). Enable or disable Universal Plug and Play protocol. UPnP helps to find the IP address of Thecus IP storage.



Bonjour Setting

Bonjour, is Apple Inc.'s trade name for its implementation of Zeroconf, a service discovery protocol. Bonjour locates devices such as printers, as well as other computers, and the services that those devices offer on a local network using multicast Domain Name System service records. This definitive guide walks you through Bonjour zero-configuration networking with a complete description of the protocols and technologies used to create Bonjour enabled applications and devices.



SSH

The device is now SSH protocol supported. It is allowed user to use SSH and having console to manipulate per needed. The SSH default login user name is “root” with full privilege and password is admin’s password. The default admin password is “admin” so once the admin password has changed then SSH login needed to change the password too.

A description for each item as following:

SSH	
Item	**Description**

SSH Service	Enable or disable SSH service.
Port	The port number is default 22.
SFTP	Enable or disable SFTP protocol under SSH service.
Apply	Click "Apply" to confirm the changes.

DDNS

To set up a server on the Internet and enable the users to connect to it easily, a fixed and easy-to remember host name is often required. However, if the ISP provides only dynamic IP address, the IP address of the server will change from time to time and is difficult to recall. You can enable the DDNS service to solve the problem. After enabling the DDNS service of the NAS, whenever the NAS restarts or the IP address is changed, the NAS will notify the DDNS provider immediately to record the new IP address. When the user tries to connect to the NAS by the host name, the DDNS will transfer the recorded IP address to the user.
The NAS supports the DDNS providers:
DyDNS.org(Dynamic DNS),DyDNS.org(Custom DNS),DyDNS.org(Static DNS), www.zoneedit.com,www.no-ip.com.

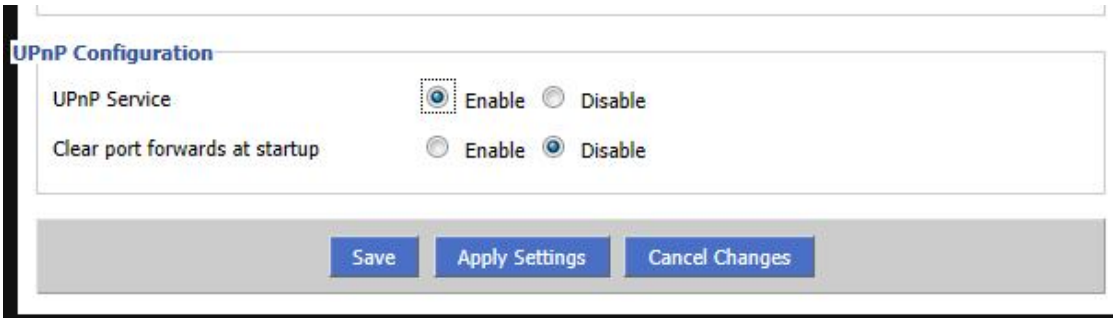
A description for each item as following:

DDNS	
Item	**Description**
DDNS Service	Enable or disable DDNS service.
Register	Choose the service provider from drop down list
User name	Input user name with DDNS registry.
Password	Input password with DDNS registry.
Domain name	Input domain name with DDNS registry.
Apply	Click "Apply" to confirm the changes.

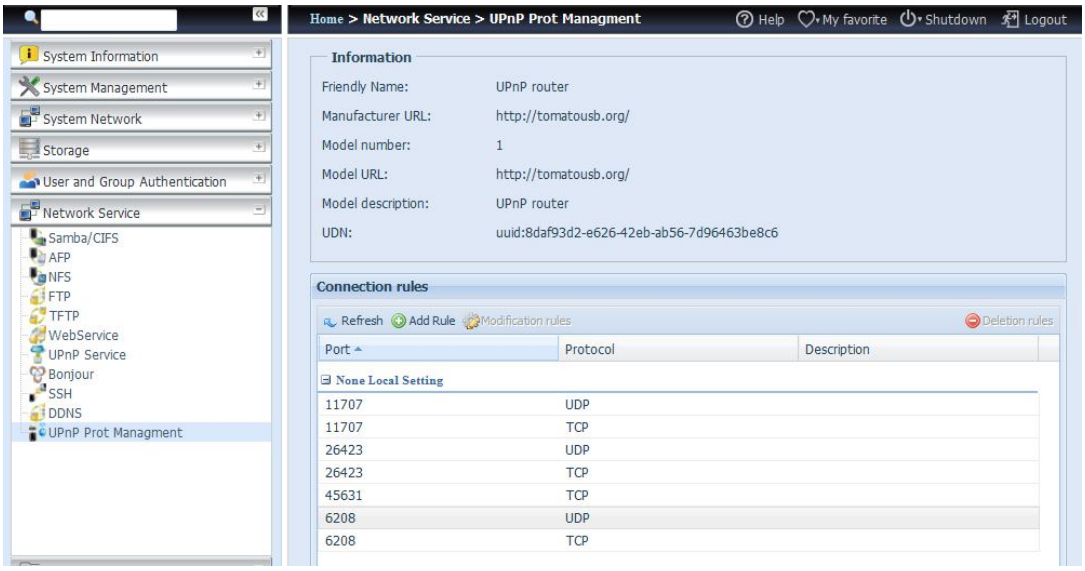
UPnP Port Management

One of most convenience way to allow user to access required services such as FTP, SSH, web disk and http etc. from Internet environment is setting UPnP port management.

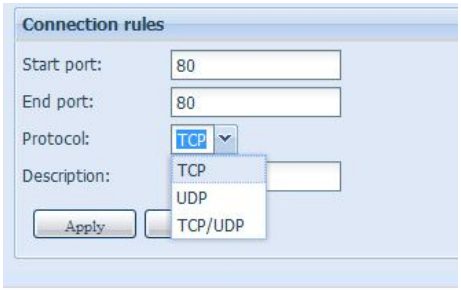
To set up this UPnP port forwarding feature, please be sure that the router has "UPnP Service" Enabled. The following is example from one of router manufacture with UPnP Configuration page.



After the router has enabled "UPnP Service" then you will have information come from associated router to UPnP port management screen as below.



And click "Add Rule" to add more port mapping from Internet to access desired services or press "Refresh" to get most updated list.



A description for each item as following:

UPnP Port Management	
Item	**Description**
Start port	Specific port number starts with.
End port	Specific port number ended
Protocol	Choose the protocol for port forwarding needed.
Description	Specific the port services if applicable.
Apply	Click "Apply" to confirm the changes.
Cancel	Click "Cancel" to abort the changes

WARNING **Some of router is not allowed to input port number below 1024. So it may have resulted "setting fails".**

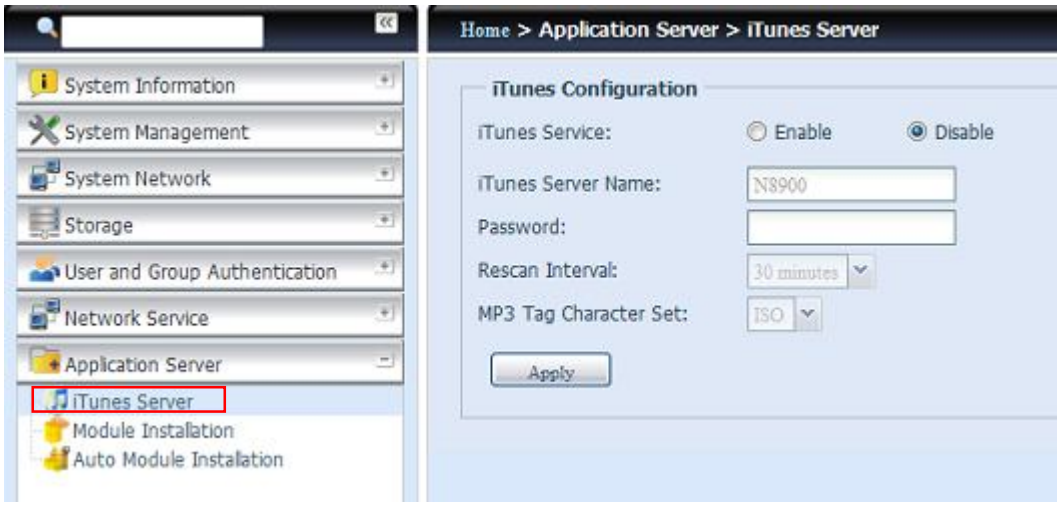
Application Server

The Thecus IP storage supports build-in application such as iTunes server. The Thecus IP storage provides activating the iTunes Server on the device. You will be able to play music files on this device with your iTunes client software directly. The following section shows you how.

iTunes® Server

With the built-in iTunes server capability, Thecus IP storage enables digital music to be shared and played anywhere on the network!

From the **Network** menu, choose the ***iTunes*** item, and the **iTunes Configuration** screen appears. You may enable or disable the iTunes Service from here. Once enabled, enter correct information for each field and press ***Apply*** to save your changes.



See the following table for detailed descriptions of each field:

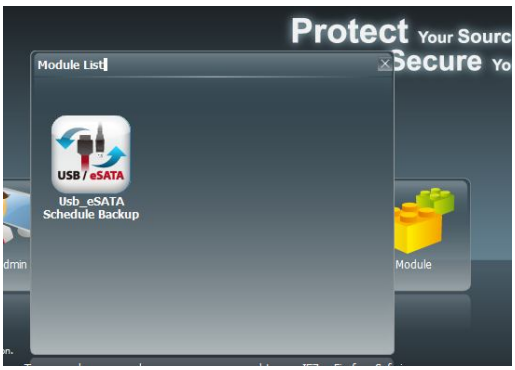
iTunes Configuration	
Item	**Description**
iTunes Service	Enable or disable the iTunes Service.
iTunes Server Name	Name used to identify Thecus IP storage to iTunes clients.
Password	Enter password to control access to your iTunes music.
Rescan Interval	Rescan interval in seconds.
MP3 Tag Encode	Specify tag encoding for MP3 files stored in Thecus IP storage. All ID3 tags will be sent out in UTF-8 format.

Once the iTunes service is enabled, Thecus IP storage will make all music located in the **Music** folder available for iTunes-equipped computers on the network.

Module Installation

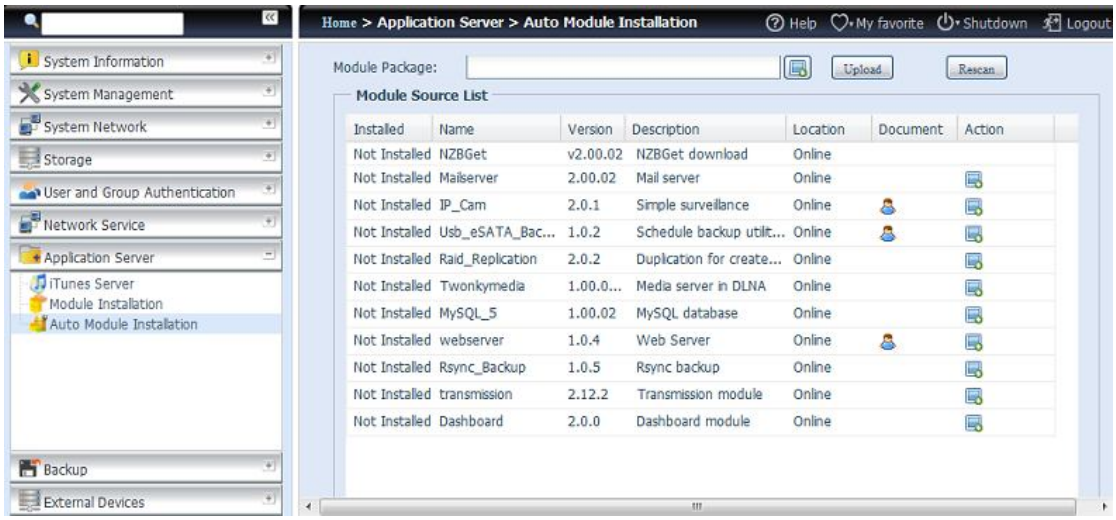
From the login page, other than admin, web disk and Piczza (Photo server) the module has newly added from this FW release. So after module has been installed there is new option can be chosen "Show in Login".

If this option has enabled then while login to the system, the modules will have associated icon to allow all of valid users to login through.



Auto Module Installation

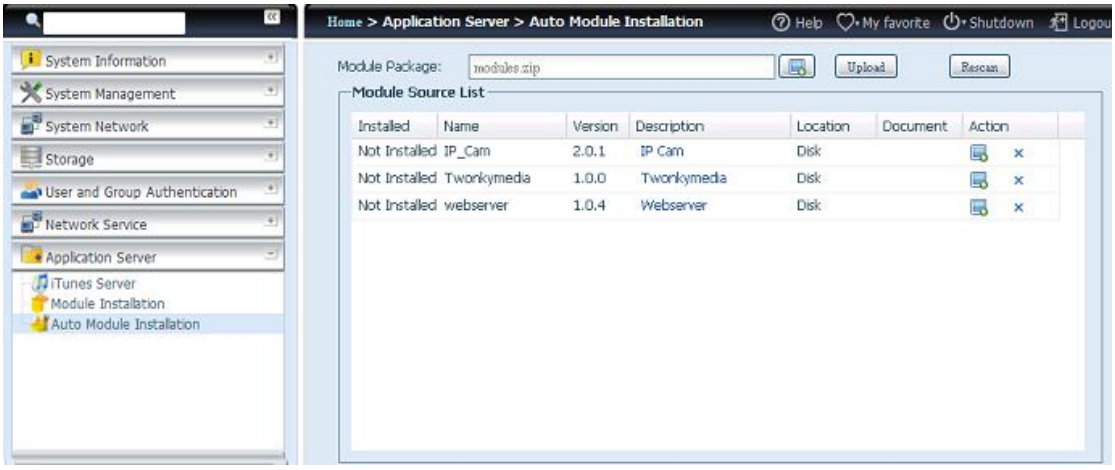
Or choose the ***Auto Module Installation*** item and the **available system Module** screen appears. The default to get module list is "On-line" so if Thecus IP storage is capable to connect to Internet then it will automatically link to Thecus official website then list available modules. Please refer the screen shot below.


Home > Application Server > Auto Module Installation
Help
My favorite
Shutdown
Logout
System Information
System Management
System Network
Storage
User and Group Authentication
Network Service
Application Server
iTunes Server
Module Installation
Auto Module Installation
Backup
External Devices
Module Package:
Upload
Rescan
Module Source List
Installed Name Version Description Location Document Action
Not Installed NZBGet v2.00.02 NZBGet download Online
Not Installed Mailserver 2.00.02 Mail server Online
Not Installed IP_Cam 2.0.1 Simple surveillance Online
Not Installed Usb_eSATA_Bac... 1.0.2 Schedule backup utilt... Online
Not Installed Raid_Replication 2.0.2 Duplication for create... Online
Not Installed Twonkymedia 1.00.0... Media server in DLNA Online
Not Installed MySQL_5 1.00.02 MySQL database Online
Not Installed webserver 1.0.4 Web Server Online
Not Installed Rsync_Backup 1.0.5 Rsync backup Online
Not Installed transmission 2.12.2 Transmission module Online
Not Installed Dashboard 2.0.0 Dashboard module Online

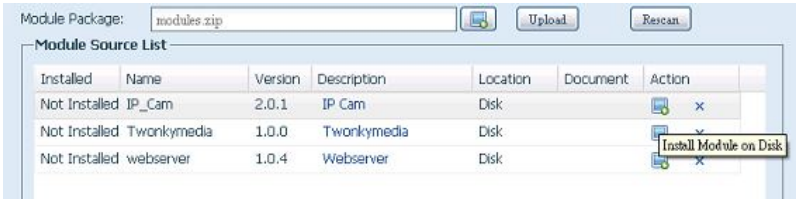
The other way to have auto module installed is using universal CD shipped with system. It has contained file "modules.zip" which included all modules while system shipped. Please refer the screenshot below.

NOTE

The modules list getting on-line of Thecus website will newly than "thecus.zip" from shipped CD. But the installation from Thecus website could have unpredictable duration due to bandwidth concern.



Auto Module Source List	
Item	**Description**
Installed	Status of module
Name	Module name
Version	The version of released version
Description	The description of module
Location	The module is either getting on-line or disk
Document	The available documentation of module
Action	To install module or deleted p.s. If module list from on-line, then no delete option available
Rescan	Click to rescan from both on-line and disk



After click on "Action" to install module, the module will be under list of Module Installation. Please do "Enable" to activate module usage.

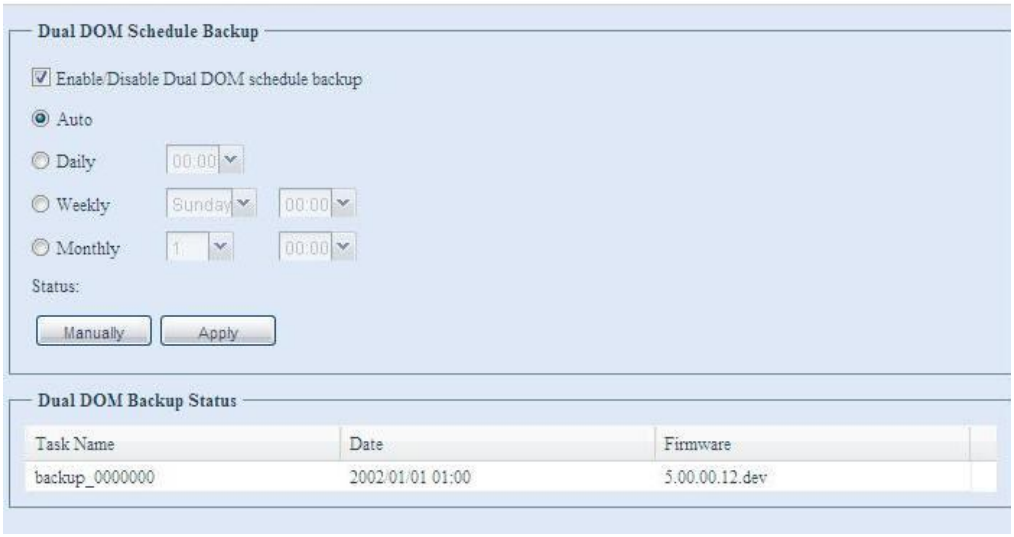
Backup

There are a number of ways to back up data with the Thecus IP storage.

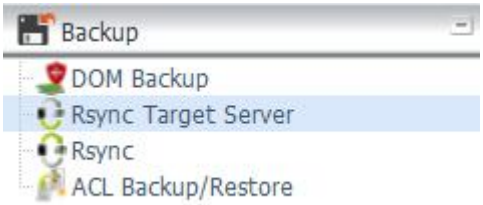
Dual DOM (N12000 series/N16000 series/N8900 series only)

The unique Dual DOM feature can now perform "Auto Repair". The Thecus NAS will backup up to five versions of the system configuration either by the default timing of 1:00am every day automatically or as scheduled by the user.

This unique "Auto Repair" will be triggered if the primary DOM has a booting issue. In this instance, the 2nd DOM will take over the boot function. Then, the system will automatically load the most recent system configuration backup image to repair the primary DOM.



Rsync Target Server



When it comes to backing up your data, it's very important to have flexibility. Rsync Backup provides you with many options, including local or remote backup, backup scheduling, different syncronization settings, and password protection. Being based on the Linux operating system, it is also much more stable and experiences much less frequent data loss during transfer than other remote backup systems.

-For this tutorial you will need to use Rsync Target Server (Step 1) and Rsync (Step 2+3) under Backup for this client/server backup feature. It also can be named lf function "Remote Replication".

Step 1 – Enabling Rsync on your target (backup) NAS

-Log in to your target (backup) NAS through the UI in your web browser
-Go to Rsync Target Server under Backup in the menu of the UI

1. Enable **Rsync Target Server**
2. Add a **username** and **password** (they can be different than your NAS's username and password)
3. Select **Apply**

NOTE

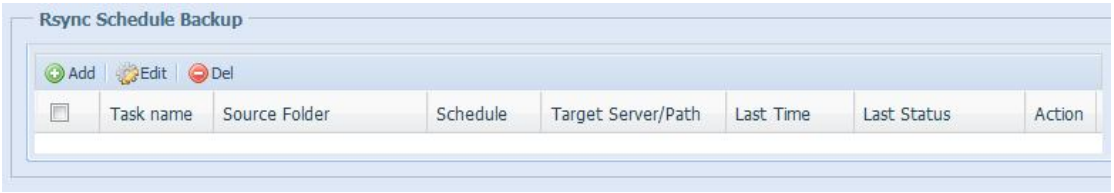
- You will need this user name and password while the data is going to remotely backup to this rsync target server.
- The Rsync target server is only allowed 3 rsync host to connect and backup from.

Now Rsync is turned on your NAS, which means it can be used as a target for Rsync backup, in other words, only the backup NAS needs to be activated in this way.

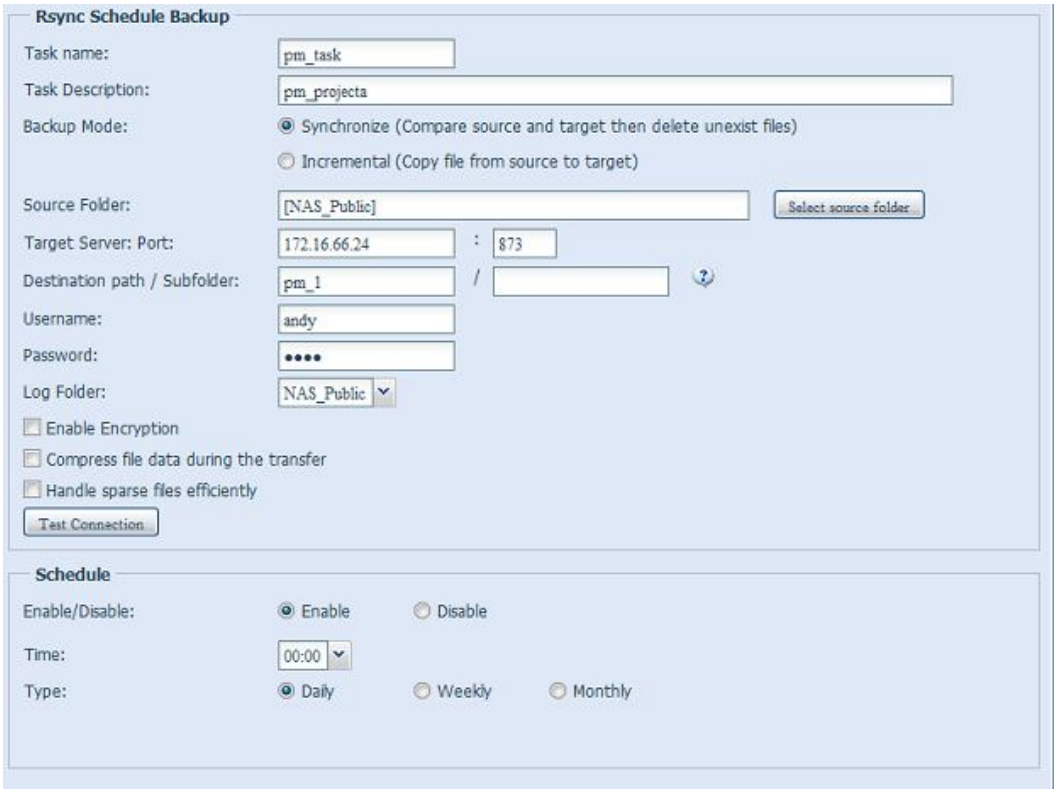
Rsync

Step 2 – Setting up your backup task and schedule on your source NAS
-Log in to your other NAS (your source NAS) through the UI in your web browser
-Go to **Rsync** under **Backup** in the menu of the UI

-From the **Rsync Schedule Backup** task list, choose **Add**



The rsync backup setting screen appear as below:



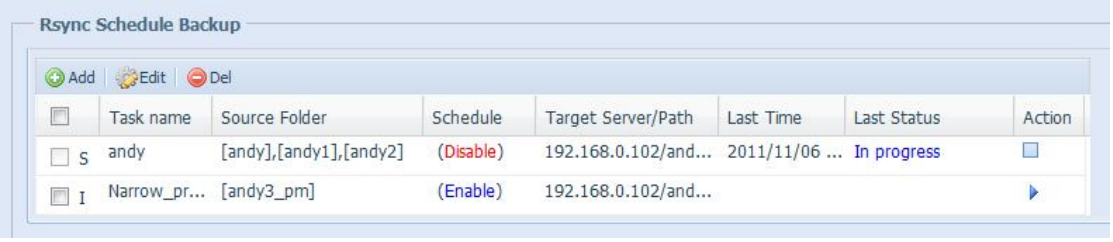
-Fill out all the necessary details and choose your parameters

Add Rsync Backup Task	
Item	**Description**
Task Name	This is how it will appear in the task list.
Task Description	Descript the task details.
Backup Mode	Synchronization mode: Makes your source match your target completely; deleting and adding files on your target as they are deleted and added on your source. Incremental Mode : Makes your source match your target and keep all old files; adding files on your target as they are added on your source, but NOT deleting files on your target as they are deleted on your source.
Source Folder	Choose the folders from drop down lists on your source NAS that you wish to backup.
Target Server : Port	Input the Rsync Target Server IP address which you are going to backup over, port number has no need to change only if the default port number has been used in other purpose.
Destination Path / Sub-folder	Input existed Rsync target server share folder path to backup source over. The sub-folder may left blank if it is not apply.
User name and Password	This is the username and password need to fill in for associate "Rsync Target Server" that you are going to copy data over.
Log Folder	Choose the folder to save the log details while rsync task is executed.
Compress file data during the transfer	With this option, rsync compresses the file data as it is sent to the destination machine, which reduces the

	amount of data being transmitted – something that is useful over a slow connection.
Handle sparse files efficiently	Try to handle sparse file efficiently so they take up less space on the destination.
Test Connection	If there is an error, review the instructions and make sure all necessary fields has filled correctly. Try to handle sparse file efficiently so they take up less space on the destination.
Schedule	To run Rsync backup manually please choose "Disable" or "Enable" the schedule to execute the Rsync task.
Add	This saves your Rsync backup task and will list in task list.

Step 3 – Manually edit or run your backup tasks

After selecting "apply", you will be brought back to the Rsync Schedule Backup task list.



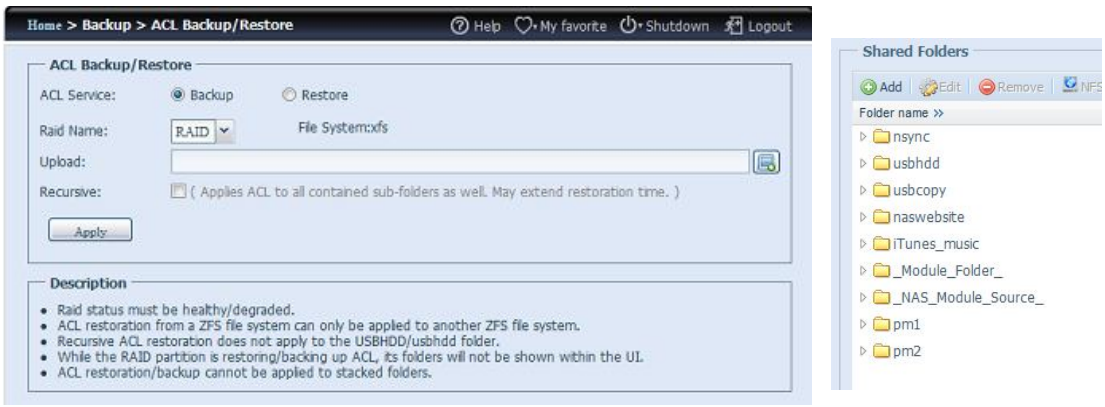
Simply click the arrow on the Action section to start the task and click the box to cancel the ongoing task. If any setting needs to be changed for task, tick the check box in front of associated task then press "Edit" button to bring up the screen.

NOTE The "S" sign in each task is denoted "Synchronize" and "I" is denoted "Incremental" for backup mode of associate task.

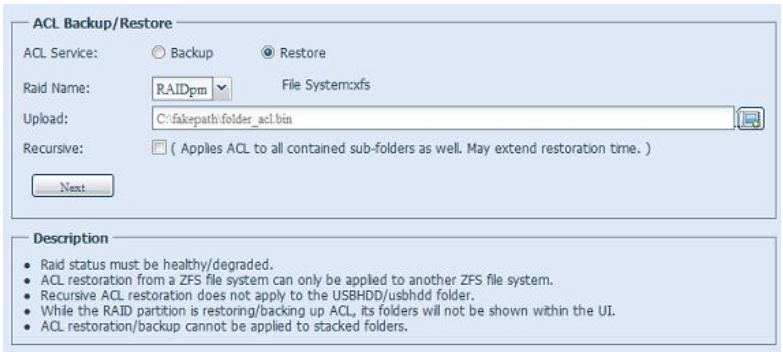
ACL Backup and Restore

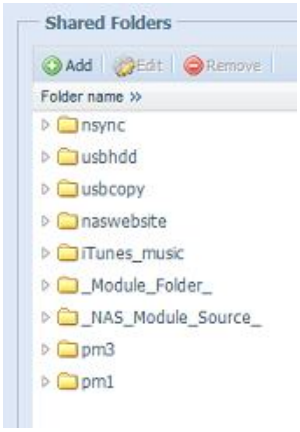
The ACL backup and restore feature are allowed system ACL (Access Control List) been backup on RAID volume based to other location and restore it while needed.

Let's take example to see how it works.
There is system with RAID volume "RAID", select "Backup" to backup this RAID volume's ACL to other location. The current RAID volume "RAID" has share folder as listed on right hand screen shot.

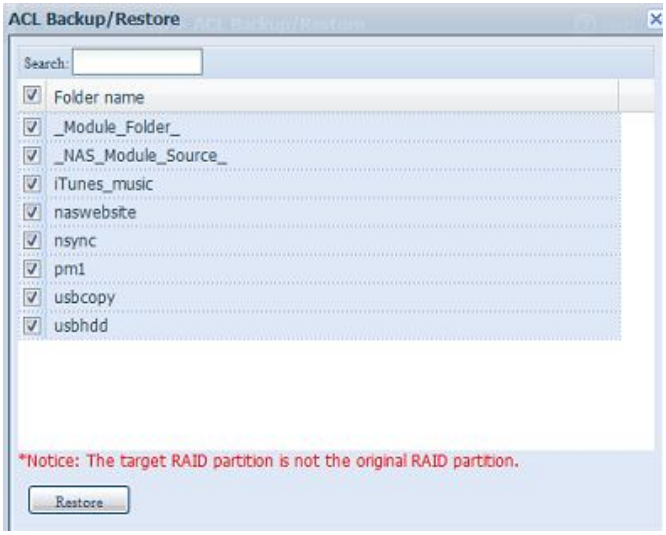


For the ACL restore,
it could be restored in same system or used in other unit. For example, restore the ACL backup file to other unit. This unit has RAID volume "RAIDpm" with share folder as listed on right hand screen shot.


ACL Backup/Restore
ACL Service:
Backup
Restore
Raid Name:
RAIDpm
File System:xfs
Upload:
C:\fakepath\folder_acl.bin
Recursive:
(Applies ACL to all contained sub-folders as well. May extend restoration time.)
Next
Description
Raid status must be healthy/degraded.
ACL restoration from a ZFS file system can only be applied to another ZFS file system.
Recursive ACL restoration does not apply to the USBHDD/usbhdd folder.
While the RAID partition is restoring/backing up ACL, its folders will not be shown within the UI.
ACL restoration/backup cannot be applied to stacked folders.



After input the ACL backup file and click "Next" button, system will come out the screen to list matched folders in between backup file and this RAID volume. Just select the desired folders for ACL restore.

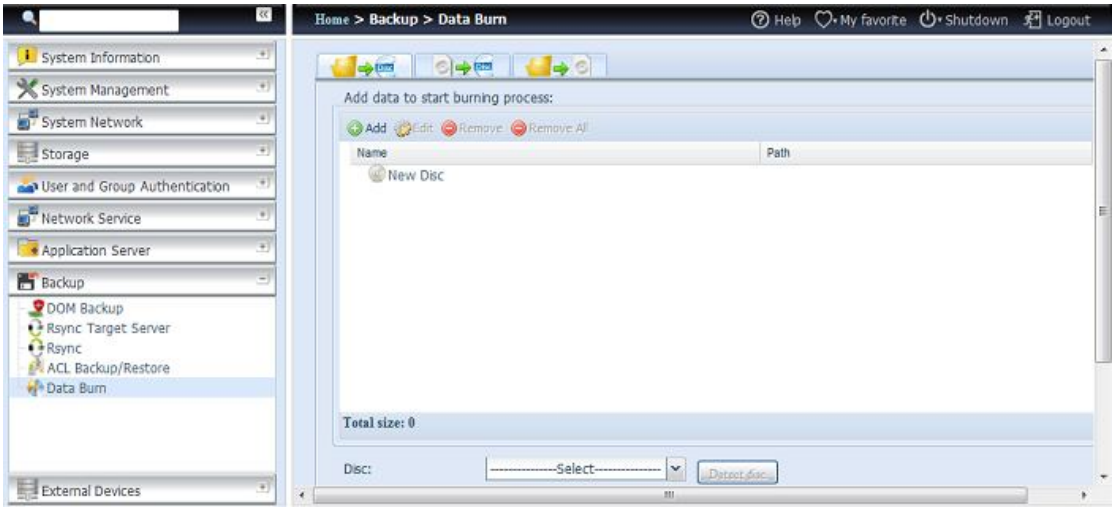


NOTE

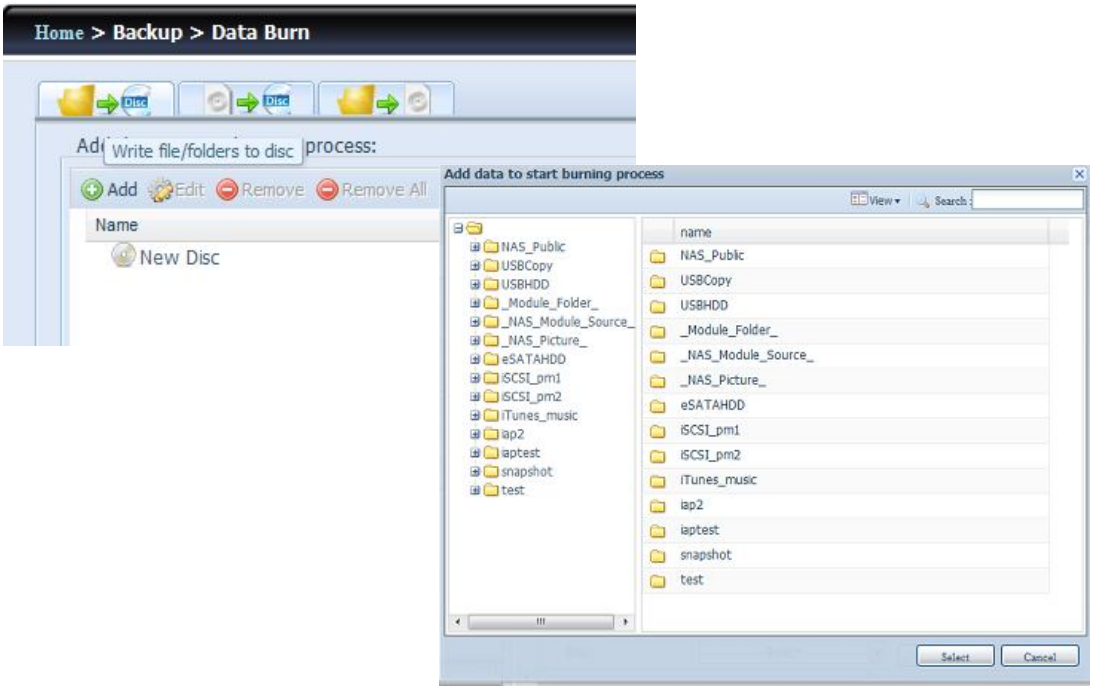
- The ACL backup will only backing the share folder level, no apply to its sub-layer.
- The ACL backup/restore can be used among ext3/ext4/XFS file system but ZFS can only be used with other RAID volume with ZFS file system created while backup/restore.
- If recursive has been checked during ACL restoration, it will apply all of its sub-folder with same permission.

Data Burn

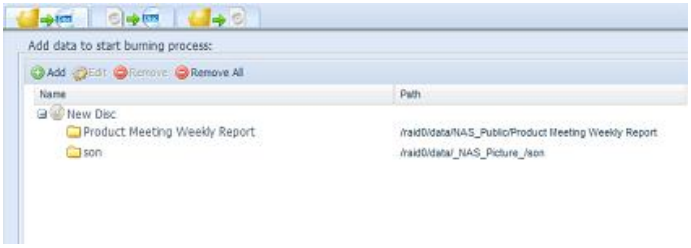
The data burn is featured to support 3 different modes of data burning for files/folders to and from image file and physical optical disk.
The 3 different modes are "Write Files/folders to disc", "Write image to disk" and "Write files/folders to image".



1. Write Files/folders to disc

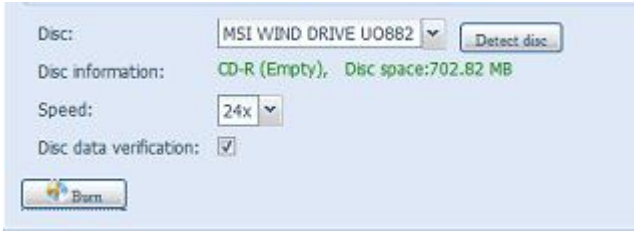


a. Click Add button and the NAS share list appear
b. Select files/folders which like to burn. All of selected folders/files will under the disc label name "New Disc". The disc label name can be changed by click on it and press "Edit" from menu bar. The selected



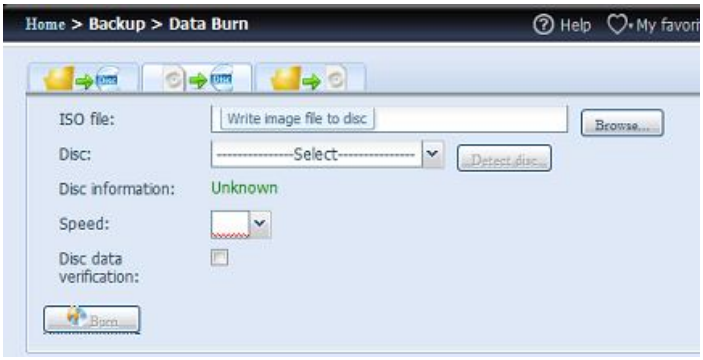
folders/files also can remove by click on it then press "remove" or "remove all" for all selected items.

c. Select from installed USB or SATA(for N6850/N8850/N10850) burning devices. And it could click "detect disc" to check the status once the disc has inserted.

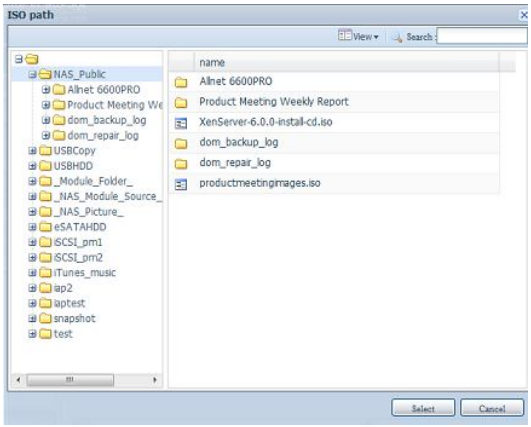


d. Select burning speed from drop down list.
e. Select whether disc data verification is required or not.
f. Click "Burn" to start disc burning.

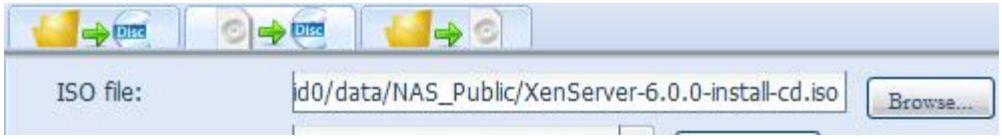
2. Write image file to disc



a. Click "Browser" and NAS share list appear to locate desired image file to burn

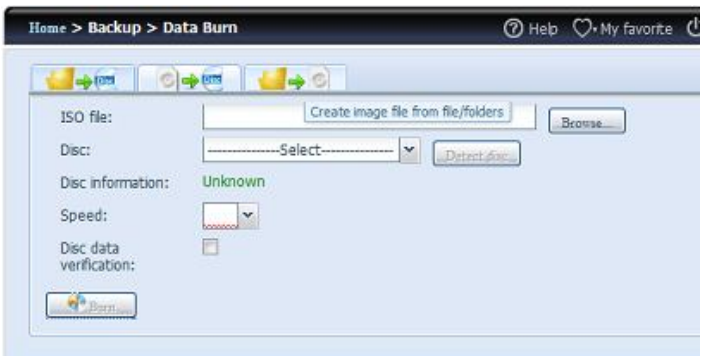


b. Select the ISO file.

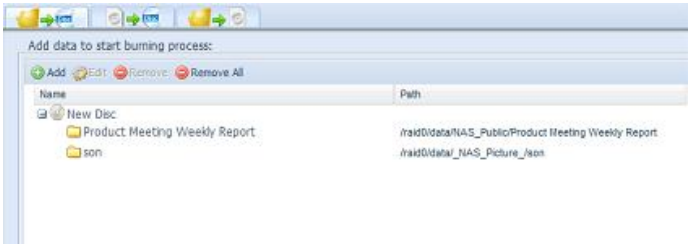


c. Select from installed USB or SATA(for N6850/N8850/N10850) burning devices. And it could click "detect disc" to check the status once the disc has inserted.
d. Select burning speed from drop down list.
e. Select whether disc data verification is required or not.
f. Click "Burn" to start disc burning.

3. Create image file from files/folders



a. Click Add button and the NAS share list appear
b. Select files/folders which like to burn. All of selected folders/files will under the disc label name "New Disc". The disc label name can be changed by click on it and press "Edit" from menu bar. The selected folders/files also can remove by click on it then press "remove" or "remove all" for all selected items.



c. Input the path where the ISO file is going to store, it can press "Browse" button to have share list appear to guide through.
d. Input ISO file name for burned image file.
e. Click "Burn" to start ISO file burning.

NOTE

- The data burn does not support rewriteable media if it has been burned data inside with left space. On the other hand, the used rewriteable media will be erased first then carry on with burning.

Thecus Backup Utility

The Thecus Backup Utility is on your Installation CD. When you click on the CD, the Backup Utility will be installed under **Program Groups** > **Thecus** > **Thecus Backup Utility**. If it is not installed, you can copy the file (**Thecus Backup Utility.exe**) to a convenient location on your hard disk and double click to execute it.

NOTE

If you can not find Thecus Backup Utility on your CD, please download it from the Thecus website (http://www.thecus.com).

When you execute this utility for the first time, it will ask you whether to create a DB file. Click ***Yes***.

1. Click ***Add*** to create a Backup task. The **Add New Task** dialog box appears.

Add New Task	
Item	**Description**
Task	Specifies a name for the current task.
Source	Click to specify the source folder/file location.
Incremental	Click to specify whether the backup will be incremental. If unchecked, the backup will be a full backup.
Destination	Click to specify the destination folder/file location.
Excluded extensions	Files with these file name extensions will be skipped and not back up to the destination.
Comments	If you wish, enter comments here for your records.

2. To schedule the task to run at regular intervals, click on the ***Schedule*** icon for that task. You can schedule the task to run **Monthly** or **Weekly**.

3. To check the log for that task, click on the ***Log*** icon for that task.

NOTE

Thecus Backup Utility also supports MAC OS X. Just copy the Thecus Backup Utility.dmg to your MAC OS X machine and double click to execute it.

Windows XP Data Backup

If you use Windows XP Professional, you can also use the Windows Backup Utility (Ntbackup.exe) to backup your files.

If you use Windows XP Home Edition, follow these steps to install the utility:

1. Insert the Windows XP CD into a drive and double-click the ***CD*** icon in **My Computer**.

2. When the Welcome to Microsoft Windows XP screen appears, click ***Perform Additional Tasks***.

3. Click ***Browse this CD***.

4. In Windows Explorer, navigate to ***ValueAdd*** > ***Msft*** > ***Ntbackup***.

5. Double-click ***Ntbackup.msi*** to install the backup utility.

Once installed, you can use the Windows Backup Utility by following the steps below:

1. Click ***Start***, and point to ***All Programs*** > ***Accessories*** > ***System Tools*** > ***Backup*** to start the wizard.

2. Click ***Next*** to skip past the opening page. Choose **Backup files and settings** from the second page, and then click ***Next***.

3. Select which option you want to back up.

4. Click ***Next*** and in the Backup Type, Destination, and Name page, specify a back up location using the ***Browse*** button.

5. Find and select the drive that specifies your Thecus IP storage as your backup destination and click ***Next***.

6. Click ***Next*** to display the wizard's final page and click ***Finish*** to start backing up.

Apple OS X Backup Utilities

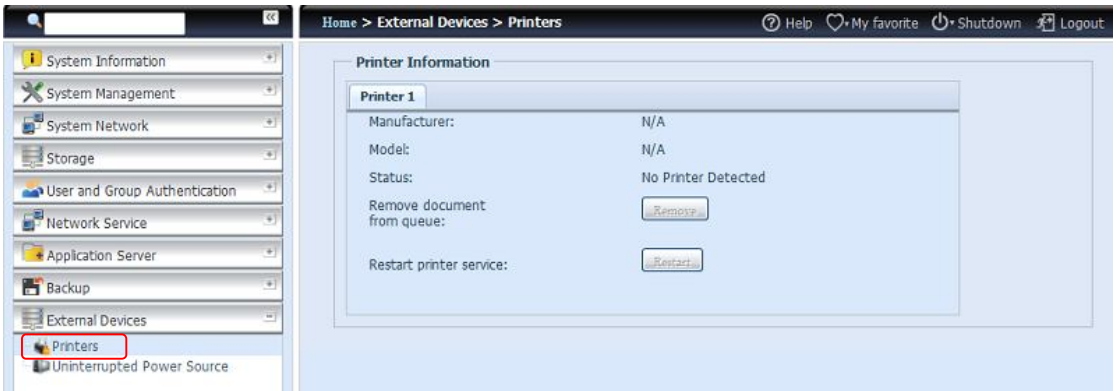
Mac OS X does not include any backup software. However, there are a number of backup solutions available for the Mac OS X, including: iBackup, Psyncx, iMSafe, Rsyncx, Folder Synchronizer X, Tri-BACKUP, Impression, Intego Personal Backup, SilverKeeper, and Apple's dotMac Backup utility to name just a few. To find even more freeware and shareware backup utilities to choose from, go to VersionTracker or MacUpdate and search on "backup".

External Devices

The Thecus IP storage supports printer server and UPS via USB interface. The integrated Print Server allows you to share a single USB printer will all users on the network. For the UPS, Thecus IP storage support via USB, Series and Network interface. The following section shows you how.

Printers

From the **External Devices** menu, choose the ***Printer*** item, and the **Printer Information** screen appears. This screen provides the following information about the USB printer connected to the USB port.



Printer Information	
Item	**Description**
Manufacturer	Displays the name of the USB printer manufacturer.
Model	Displays the model of the USB printer.
Status	Displays the status of the USB printer.
Remove document from Queue	Click to remove all documents from printer queue

Restart Printer service	Click to restart printer service

If a corrupt print job is sent to a printer, printing may suddenly fail. If your print jobs seem to be locked up, pressing the ***Remove All Documents*** button to clear the print queue may resolve the issue.

You can configure Thecus IP storage to act as a printer server. That way, all PCs connected to the network can utilize the same printer.

Windows XP SP2

To set up the Printer Server in Windows XP SP2, follow the steps below:

1. Connect the USB printer to one of the USB ports (preferably the rear USB ports; front USB ports can be used for external HDD enclosures).
2. Go to ***Start*** > ***Printers and Faxes***.
3. Click on **File** > **Add Printer**.
4. The **Add Printer Wizard** appears on your screen. Click ***Next***.
5. Select the "***A network printer, or a printer attached to another computer***" option.
6. Select "***Connect to a printer on the Internet or on a home or office network***", and enter "**`http://Thecus IP storage IP_ADDRESS:631/printers/usb-printer`**" into the URL field.
7. Your Windows system will ask you to install drivers for your printer. Select correct driver for your printer.
8. Your Windows system will ask you if you want to set this printer as "Default Printer". Select ***Yes*** and all your print jobs will be submitted to this printer by default. Click ***Next***.
9. Click ***Finish***.

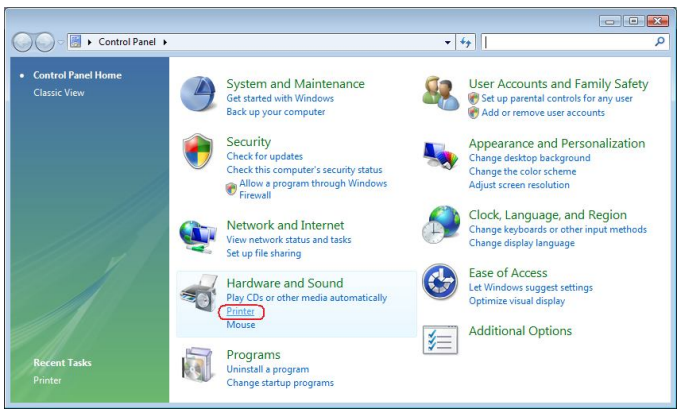
NOTE

- Note that if a multi-function (all-in-one) printer is attached to the Thecus IP Storage, usually only the printing and fax functions will work. Other features, such as scanning, will probably not function.

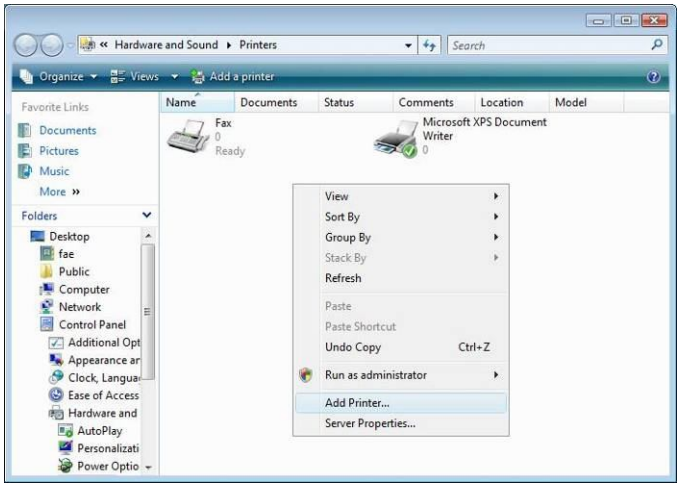
Windows Vista

To set up the Printer Server in Windows Vista, follow the steps below:

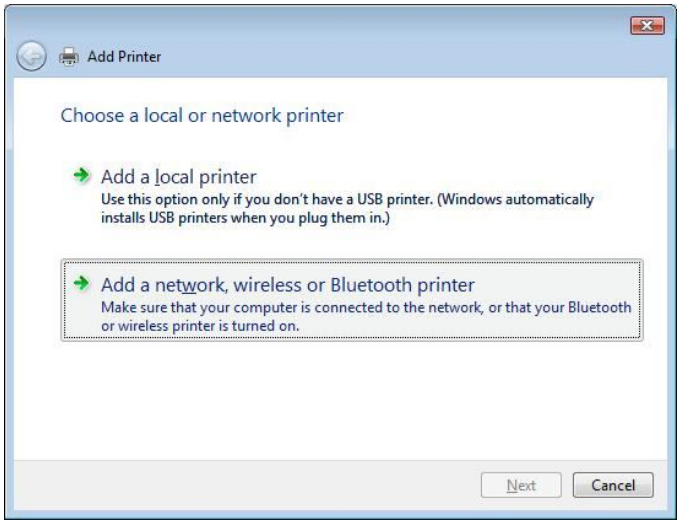
1. Open ***Printer Folder*** from the **Control Panel**.



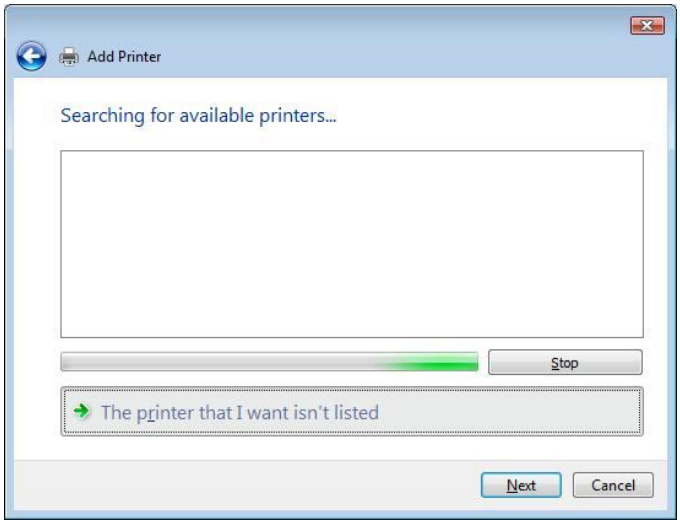
2. Click the right mouse button in anywhere on the **Printers** folder and then select ***Add Printer***.



3. Select ***Add a network, wireless or Bluetooth printer***.

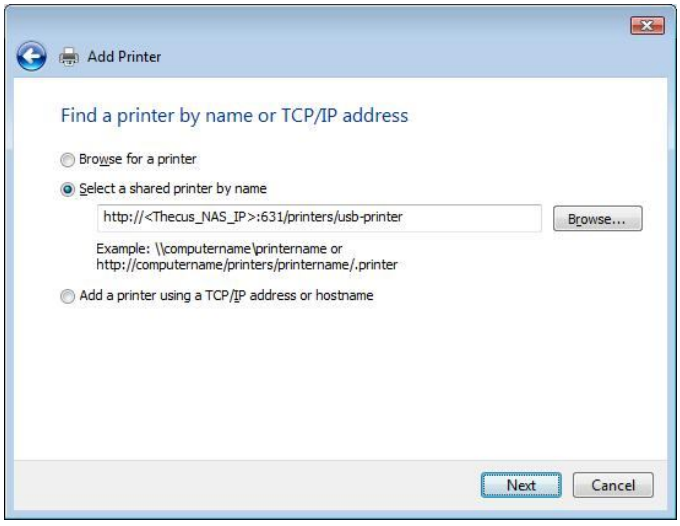

Add Printer
Choose a local or network printer
Add a local printer
Use this option only if you don't have a USB printer. (Windows automatically installs USB printers when you plug them in.)
Add a network, wireless or Bluetooth printer
Make sure that your computer is connected to the network, or that your Bluetooth or wireless printer is turned on.
Next
Cancel

4. Select ***The printer that I want isn't listed***.



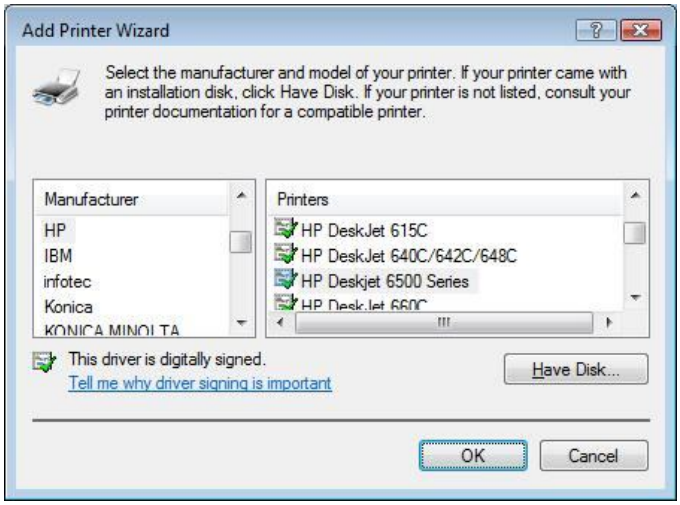
You can press ***The printer that I want isn't listed*** to go into next page without waiting for **Searching for available printers** to finish.

5. Click ***Select a shared printer by name***.

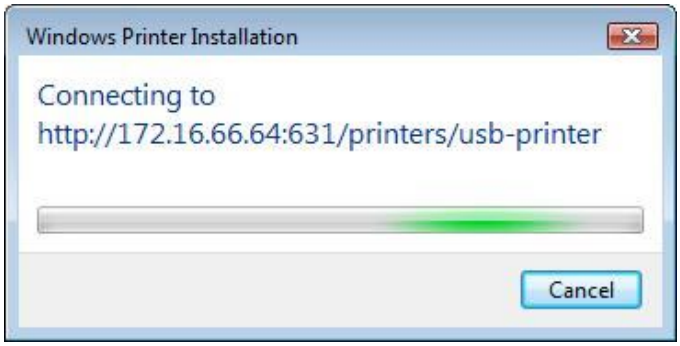


Type `http://<Thecus_NAS>:631/printers/usb-printer` in the box, where `<Thecus_NAS_IP>` is the IP address of Thecus IP storage. Click ***Next***.

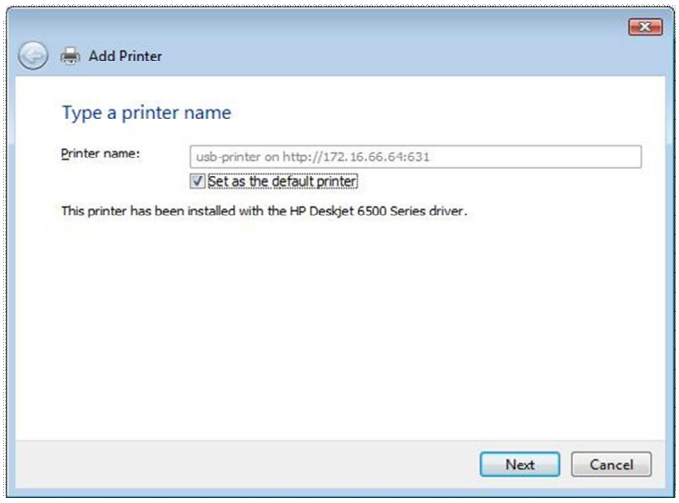
6. Select or install a printer and then press ***OK***.


Add Printer Wizard
Select the manufacturer and model of your printer. If your printer came with an installation disk, click Have Disk. If your printer is not listed, consult your printer documentation for a compatible printer.
Manufacturer
HP
IBM
infotec
Konica
KONICA MINOLTA
Printers
HP DeskJet 615C
HP DeskJet 640C/642C/648C
HP Deskjet 6500 Series
This driver is digitally signed.
Tell me why driver signing is important
Have Disk...
OK
Cancel

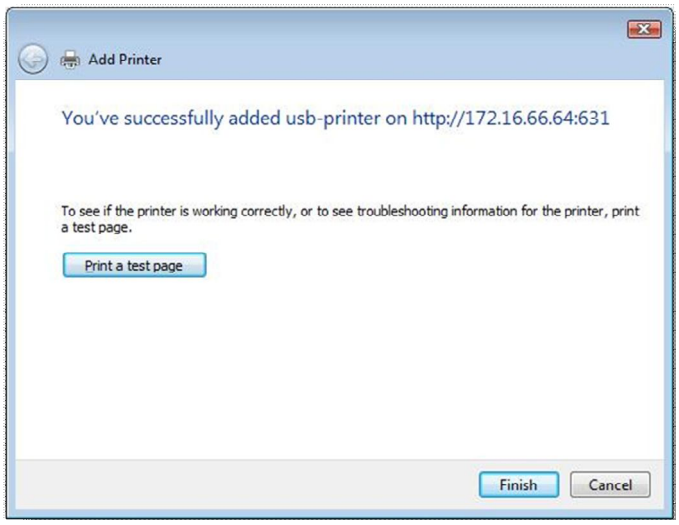
7. Windows will attempt to connect to the printer.



8. You can choose to set this printer as the default printer by checking the ***Set as the default printer*** box. Click ***Next*** to continue.

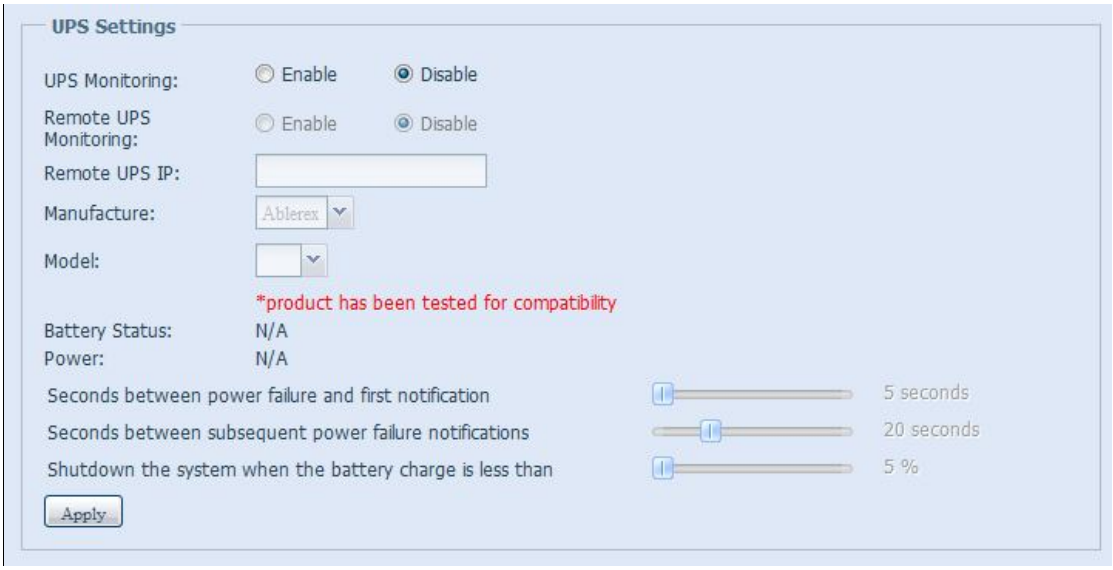


9. Done! Click ***Finish***.


Add Printer
You've successfully added usb-printer on http://172.16.66.64:631
To see if the printer is working correctly, or to see troubleshooting information for the printer, print a test page.
Print a test page
Finish
Cancel

Uninterrupted Power Source

From the **External Devices** menu, choose the ***Uninterrupted Power Source*** item and the **UPS Setting** screen appears. Make any changes you wish, and press ***Apply*** to confirm changes.



See the following table for a detailed description of each item.

UPS Setting	
Item	**Description**
UPS Monitoring	Enable or disable UPS monitoring.
Remote UPS Monitoring	Enable or disable Remote UPS monitoring.
Remote UPS IP	Input the IP address of the NAS that the UPS device is connected to via USB or RS232.Input the IP address of your network UPS.
Manufacturer	Choose the UPS manufacturer from the dropdowns.
Model	Choose the UPS model number from the dropdowns.
Battery Status	Current status of the UPS battery
Power	Current status of the power being supplied to the UPS
Seconds between power failure and first notification	Delay between power failure and first notification in seconds.
Seconds between subsequent power failure notifications	Delay between subsequent notifications in seconds.
Shutdown the system when the battery charge is less than	Amount of UPS battery remaining before system should auto-shutdown.
Apply	Press ***Apply*** to save your changes.

Chapter 5: Tips and Tricks

USB and eSATA Storage Expansion

The Thecus IP storage supports external USB hard disks through its USB ports. Once a USB hard disk has successfully mounted, the entire volume will be linked automatically to the default USB HDD folder. The Thecus IP storage supports USB external storage devices. All file names on the USB disk volume are case sensitive.

The Thecus IP storage also supports eSATA hard disks with its eSATA port.

Before attaching an eSATA or USB disk drive to Thecus IP storage, you have to partition and format it on a desktop computer or a notebook first. The attached device will be located at `\\192.168.1.100\usbhdd\sd(x)1` where `192.168.1.100` means the IP address of Thecus IP storage and `sd(x)1` stands for the first partition on the eSATA or USB disk drive.

Remote Administration

You can set up your Thecus IP storage for remote administration. With remote administration, you can access your Thecus IP storage over the Internet, even if your Thecus IP storage is behind a router. This is especially useful if you are traveling and suddenly need a file from your Thecus IP storage.

Setting up remote administration is a three-part process, and will require the following equipment:

- Thecus IP storage device
- Cable / DSL Router with Dynamic DNS support
- Home PC
- Internet Connection

NOTE

Router setup will differ slightly depending on router used. For this example, we will use the Asus WL500g because it has support for Dynamic DNS. Contact your router hardware vendor for setup help.

Part I - Setup a DynDNS Account

1. Go to `http://www.dyndns.org` from your home PC.
2. Click on the ***Sign Up Now*** link.
3. Check the Check boxes, select a user name (i.e.: N12000), enter your email address (i.e.: xxx@example.com), check ***Enable Wildcard***, and create a password (i.e.: xxxx).
4. Wait for an email from www.dyndns.org.
5. Open the email and click on the link to activate your account

Part II - Enable DDNS on the Router

1. Go to the router setup screen and select ***IP Config*** > ***Miscellaneous DDNS Setting*** from your Home PC.
2. Click on ***Yes*** for **Enable the DDNS Client?**
3. Select **`www.dyndns.org`**.
4. Go to router setup screen, and enter the following information:
    a. User Name or E-mail Address: **xxx@example.com**
    b. Password or DDNS Key: **xxxx**
    c. Host Name: **`www.N12000.dyndns.org`**
    d. Enable wildcard? Select ***Yes***
    e. Update Manually: Click ***Update***

Part III - Setting up Virtual Servers (HTTPS)

1. Navigate to ***NAT Setting*** > ***Virtual Server***.
2. For **Enable Virtual Server?**, select ***Yes***
3. Setup the HTTPS Server
    a. **Well-Known Applications**: Select **User Defined**
    b. **Local IP**: Enter **`192.168.1.100`**
    c. **Port Range**: **`443`** (the default HTTPS port setting on the Thecus IP storage)
    d. **Protocol**: select **TCP**
    e. Click ***Add***.
    f. Click ***Apply***.
4. Test the HTTPS connection from another computer on the Internet
    a. From a remote computer, open your browser and enter **`https://www.N12000.dyndns.org`**
    b. You should see the login page of Thecus IP storage.

Firewall Software Configuration

If you are using a software firewall (i.e. Norton Internet Security) and are having trouble connecting to Thecus IP storage, you can try the following steps:

1. Double click the **NIS** icon on system tray, and then configure the **Personal Firewall**.

2. On the **Programs** page, find the **SetupWizard.exe** and change its permission to "Permit All". If it's not in the program list, use the **Add** or **Program Scan** buttons to find it.

3. On the **Networking** page, manually add Thecus IP storage IP address (i.e. `192.168.1.100`) to the **Trusted** list.

Replacing Damaged Hard Drives

If you are using RAID 1, RAID 5, RAID 6, RAID 50 or RAID 60 you can easily replace a damaged hard drive in the Thecus IP storage while keeping your data secure with the system's automatic data recovery.

Hard Drive Damage

When a hard drive is damaged and data in the RAID volume, the system OLED will display warning message also the system beeps.

Replacing a Hard Drive

To replace a hard disk drive in Thecus IP storage:

1. Remove the tray with the damaged hard disk.
2. Unscrew the damaged hard disk and remove it from the tray.
3. Slide a new hard disk into the tray and fasten the screws.
4. Insert the hard disk tray back into Thecus IP storage until it snaps into place. You can also lock it with a key if desired.
5. The LED blinks green when the HDD is accessed.

RAID Auto-Rebuild

When using RAID 1, 5, 6,10, 50 or 60 on Thecus IP storage, you can use the auto-rebuild function when an error is detected.

1. When a hard disk fails the system beeps and/or an email notification is sent to specified receivers.
2. Check the OLED to see which disk has failed.
3. Follow the steps mentioned above to replace the failed hard disk.
4. The system automatically recognizes the new hard disk and starts the auto-rebuild sequence to resume its status before the hard disk crash.

Chapter 6: Troubleshooting

Forgot My Network IP Address

If you forget your network IP address and have no physical access to the system, you can find out the IP address by either looking directly onto Thecus IP storage OLED panel, or by using the setup wizard to retrieve the IP of your Thecus IP storage.

1. Start the Setup Wizard, and it will automatically detect all Thecus IP storage products on your network.

2. You should be able to find the IP address of Thecus IP storage which you have forgotten in the **Device Discovery** screen.

Can't Map a Network Drive in Windows XP

You may have problems mapping a network drive under the following conditions:

1. The network folder is currently mapped using a different user name and password. To connect using a different user name and password, first disconnect any existing mappings to this network share.

2. The mapped network drive could not be created because the following error has occurred: **Multiple connections to a server or shared resource by the same user, using more than one user name, are not allowed.** Disconnect all previous connections to the server or shared resource and try again.

To check out existing network connections, type `net use` under the DOS prompt. You may refer the URL below for more network mapping information.

http://esupport.thecus.com/support/index.php?_m=downloads&_a=viewdownload&downloaditemid=57&nav=0

Restoring Factory Defaults

From the **System** menu, choose the ***Factory Default*** item and **the Reset to Factory Default** screen appears. Press ***Apply*** to reset Thecus IP storage factory default settings.

WARNING Resetting to factory defaults will not erase the data stored in the hard

Problems with Time and Date Settings

The administrator is able to select an NTP Server to keep Thecus IP storage time synchronized. However, if Thecus IP storage can not access the Internet, you may encounter a problem when setting the Time and Time Zone. If this happens:

1. Login to the Web Administration Interface.
2. Navigate to **System Management>*Time***.
3. Under **NTP Server**, select ***No***.
4. Set the **Date**, **Time**, and **Time Zone**.
5. Click ***Apply***.

In addition, if Thecus IP storage is able to access the Internet and you want to keep the NTP Server clock.isc.org by default, please make sure the DNS Server is correctly entered, thereby allowing the NTP Server name to correctly resolve. (See **System *Network*** > ***WAN/LAN1*** > ***DNS Server***)

Dual DOM Supports for Dual Protection(N12000 series/N16000 series/N8900 series only)

The most advance and useful of Thecus IP storage (depend on models) is Dual DOM implemented. In the normal circumstance, it has no need to have this feature involved. But with irresistible cause like power cut or human error by accident occurred especially during system booting stage, this will become the great feature to prevent system down time.
Practically while it happened, system will try to recovery the DOM 1 from DOM 2 first. If it is unachievable then system can boot from DOM 2. And all of this procedure can be operated by OLED.

NOTE

The Dual DOM in DOM1 is default master and FW upgrading will only execute in DOM1 unlike DOM2 is 'Read only" initially.
Any circumstance occurred, while DOM2 successes recover DOM1. The FW will be version of DOM2. Therefore, it may need to upgrade to the version of DOM1 it has.
If DOM1 can not be recovery from DOM2, then system will boot up from DOM2. The original configuration in DOM1 may need to setup again with DOM2 operation.

Appendix A: Customer Support

If your Thecus IP storage is not working properly, we encourage you to check out **Chapter 6: Troubleshooting**, located in this manual. You can also try to ensure that you are using the latest firmware version for your Thecus IP storage. Thecus is committed to providing free firmware upgrades to our customers. Our newest firmware is available on our Download Center:

http://www.thecus.com/download.php

If you are still experiencing problems with your Thecus IP storage, or require a Return Merchandise Authorization (RMA), feel free to contact technical support via our Technical Support Website:

http://www.thecus.com/support_tech.php

Customers in the US should send all technical support enquiries to the US contact window included in the following web page:

http://www.thecus.com/support_tech.php

For Sales Information you can e-mail us at:

sales@thecus.com

Thank you for choosing Thecus!

Appendix B: RAID Basics

Overview

A Redundant Array of Independent Disks (RAID) is an array of several hard disks that provide data security and high performance. A RAID system accesses several hard disks simultaneously, which improves I/O performance over a single hard disk. Data security is enhanced by a RAID, since data loss due to a hard disk failure is minimized by regenerating redundant data from the other RAID hard disks.

Benefits

RAID improves I/O performance, and increases data security through fault tolerance and redundant data storage.

Improved Performance

RAID provides access to several hard disk drives simultaneously, which greatly increases I/O performance.

Data Security

Hard disk drive failure unfortunately is a common occurrence. A RAID helps prevent against the loss of data due to hard disk failure. A RAID offers additional hard disk drives that can avert data loss from a hard disk drive failure. If a hard drive fails, the RAID volume can regenerate data from the data and parity stored on its other hard disk drives.

RAID Levels

The Thecus IP storage supports standard RAID levels 0, 1, 5, 6, 10, 50, 60 and JBOD. You choose a RAID level when you create a system volume. The factors for selecting a RAID level are:

- Your requirements for performance
- Your need for data security
- Number of hard disk drives in the system, capacity of hard disk drives in the system

The following is a description of each RAID level:

RAID 0

RAID 0 is best suited for applications that need high bandwidth but do not require a high level of data security. The RAID 0 level provides the best performance of all the RAID levels, but it does not provide data redundancy.

RAID 0 uses disk striping and breaking up data into blocks to write across all hard drives in the volume. The system can then use multiple hard drives for faster read and write. The stripe size parameter that was set when the RAID was created determines the size of each block. No parity calculations complicate the write operation.

RAID 1

RAID 1 mirrors all data from one hard disk drive to a second one hard disk drive, thus providing complete data redundancy. However, the cost of data storage capacity is doubled.

This is excellent for complete data security.

RAID 5

RAID 5 offers data security and it is best suited for networks that perform many small I/O transactions at the same time, as well as applications that require data security such as office automation and online customer service. Use it also for applications with high read requests but low write requests.

RAID 5 includes disk striping at the byte level and parity information is written to several hard disk drives. If a hard disk fails the system uses parity stored on each of the other hard disks to recreate all missing information.

RAID 6

RAID 6 is essentially an extension of RAID level 5 which allows for additional fault tolerance by using a second independent distributed parity scheme (dual parity) Data is striped on a block level across a set of drives, just like in RAID 5, and a second set of parity is calculated and written across all the drives; RAID 6 provides for an extremely high data fault tolerance and can sustain two simultaneous drive failures.

This is a perfect solution for mission critical applications.

RAID 10

RAID 10 is implemented as a striped array whose segments are RAID 1 arrays. RAID 10 has the same fault tolerance as RAID level 1.
RAID 10 has the same overhead for fault-tolerance as mirroring alone. High I/O rates are achieved by striping RAID 1 segments.
Under certain circumstances, RAID 10 array can sustain up to 2 simultaneous drive failures

Excellent solution for applications that would have otherwise gone with RAID 1 but need an additional performance boost.

RAID 50

A RAID 50 combines the straight block-level striping of RAID 0 with the distributed parity of RAID 5. This is a RAID 0 array striped across RAID 5 elements. It requires at least 6 drives.

RAID 60

A RAID 60 combines the straight block-level striping of RAID 0 with the distributed double parity of RAID 6. That is, a RAID 0 array striped across RAID 6 elements. It requires at least 8 disks.

JBOD

Although a concatenation of disks (also called JBOD, or "Just a Bunch of Disks") is not one of the numbered RAID levels, it is a popular method for combining multiple physical disk drives into a single virtual one. As the name implies, disks are merely concatenated together, end to beginning, so they appear to be a single large disk.

As the data on JBOD is not protected, one drive failure could result total data loss.

Stripe Size

The length of the data segments being written across multiple hard disks. Data is written in stripes across the multiple hard disks of a RAID. Since multiple disks are accessed at the same time, disk striping enhances performance. The stripes can vary in size.

Disk Usage

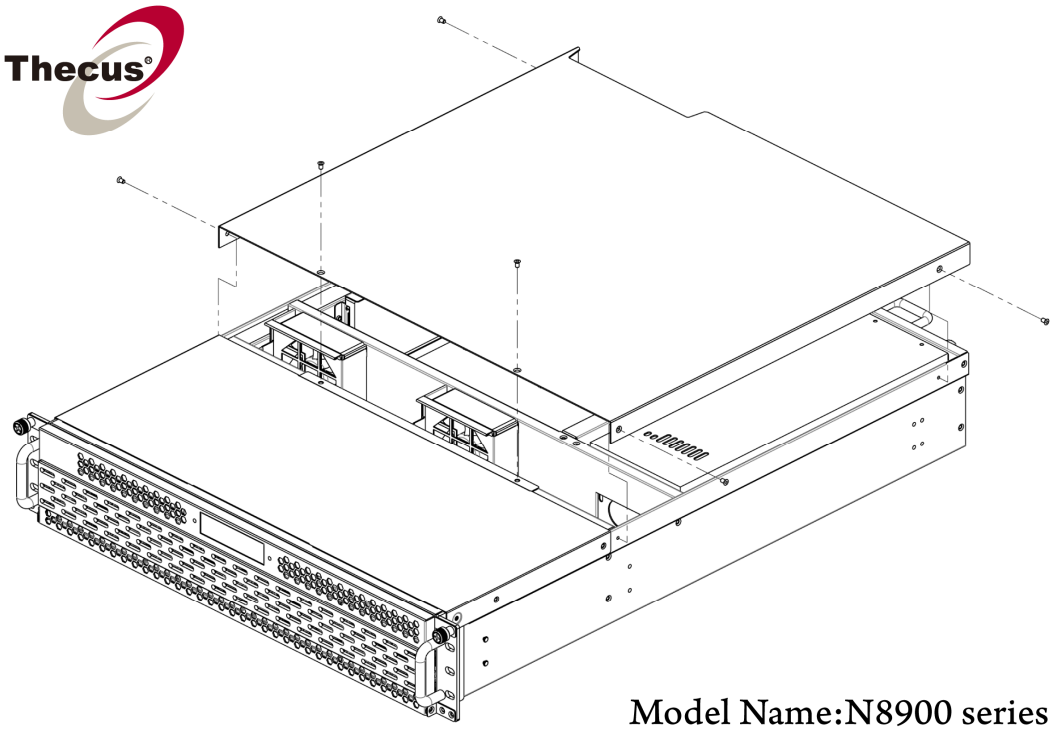
When all disks are of the same size, and used in RAID, Thecus IP storage disk usage percentage is listed below:

RAID Level	Percentage Used
RAID 0	100%
RAID 1	1/n x 100%
RAID 5	(n-1)/n x 100%
RAID 6	(n-2)/n x 100%
RAID 10	50%
RAID 50	(n-1)/n x 100%
RAID 60	(n-2)/n x 100%
JBOD	100%

n：HDD number

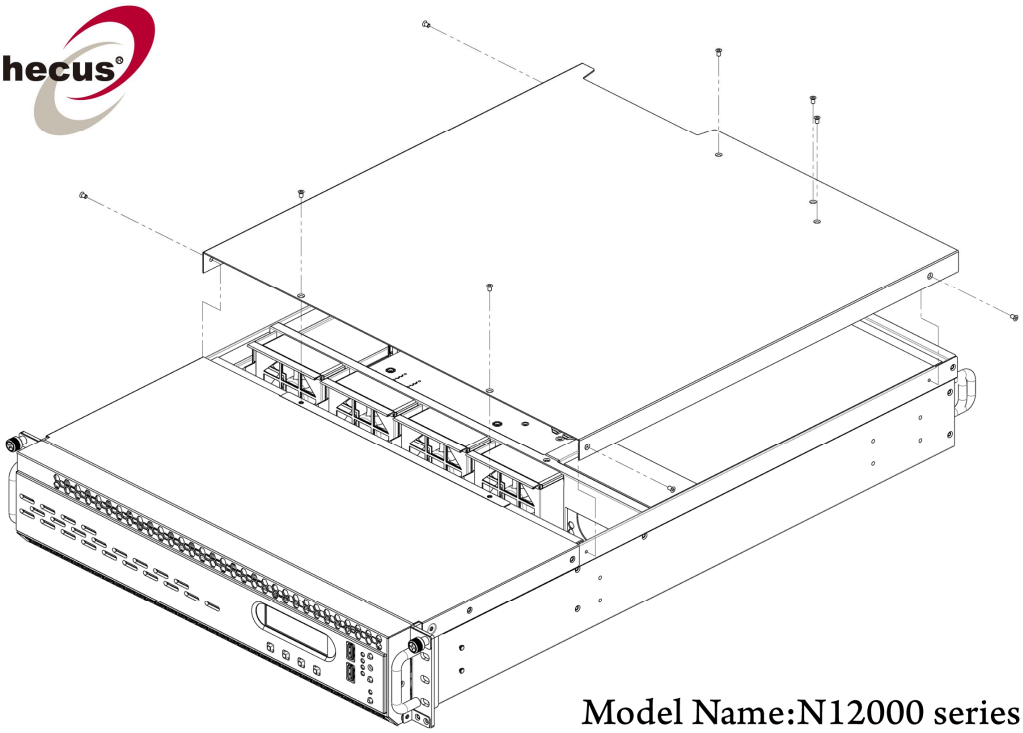
Appendix C: How to open the top cover

N8900 series:



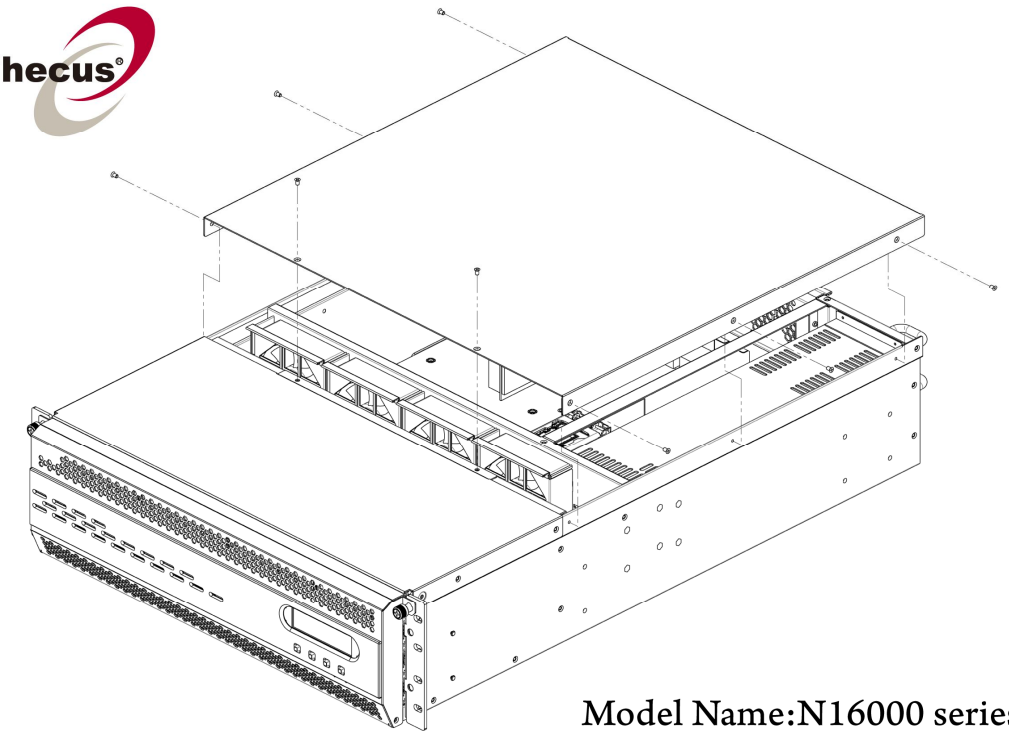
Model Name:N8900 series

N12000 series:



Model Name:N12000 series

N16000 series:



Model Name:N16000 series

Appendix D: Active Directory Basics

Overview

With Windows 2000, Microsoft introduced Active Directory (ADS), which is a large database/information store. Prior to Active Directory the Windows OS could not store additional information in its domain database. Active Directory also solved the problem of locating resources; which previously relied on Network Neighborhood, and was slow. Managing users and groups were among other issues Active Directory solved.

What is Active Directory?

Active Directory was built as a scalable, extensible directory service that was designed to meet corporate needs. A repository for storing user information, accounts, passwords, printers, computers, network information and other data, Microsoft calls Active Directory a "namespace" where names can be resolved.

ADS Benefits

ADS lets Thecus IP storage integrate itself with the existing ADS in an office environment. This means the Thecus IP storage is able to recognize your office users and passwords on the ADS server. Other major benefits ADS support provides include:

1. Easy integration of Thecus IP storage into the existing office IT infrastructure

   The Thecus IP storage acts as a member of the ADS. This feature significantly lowers the overhead of the system administrator. For example, corporate security policies and user privileges on an ADS server can be enforced automatically on Thecus IP storage.

2. Centralized user/password database

   The Thecus IP storage does not maintain its own copy of the user/password database. This avoids data inconsistency between Thecus IP storage and other servers. For example, without ADS support, an administrator might need to remove a specific user privilege on Thecus IP storage and each individual server. With ADS support, the change on an ADS server is known to all of its ADS members.

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